AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING

Four years ago, cooled restaurants were just becoming common. But competition and customer preference for cooled places to eat forced more and more to cool. Today, summer cooling is an accepted part of most good restaurants' service. This will be an excellent field for cooling during the next five years, particularly for the contractor who can devise central systems to operate under adverse conditions.

ABLISHED
8 8 0

DAY
1937

THE AIR CONDITIONING SECTION

Ability!

Berger has the ABILITY to supply jackets for every heating and air-conditioning need!

● Let Berger modernize and beautify the boilers, oil burners, water heaters, stokers and air-conditioning units you manufacture, with Berloy steel jackets tailored to individual needs!

We can definitely help you create a greater demand for your products. A highly competent, widely-experienced staff of designers is prepared to analyze your requirements, and submit recommendations.

Berloy metal-working specialists, supported by *complete*, efficient facilities for sheet metal products of every description, can develop low-cost production schedules for your jackets.

Write Berger for free engineering advice on your jacket problems, *now!*

Tailored steel jacket for oil-burning, air-conditioning unit, especially made for the Fox Furnace Co., Elyria, Ohio.

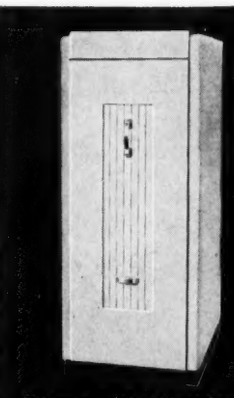
THE BERGER MANUFACTURING CO.

(Subsidiary of Republic Steel Corporation)

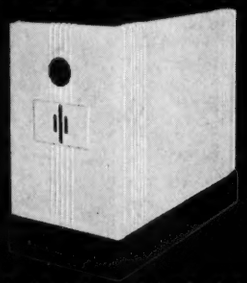
CANTON, OHIO

REPUBLIC STEEL — B — REPUBLIC STEEL

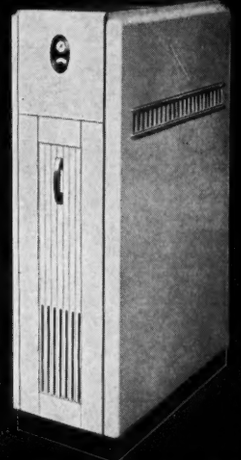
BERLOY



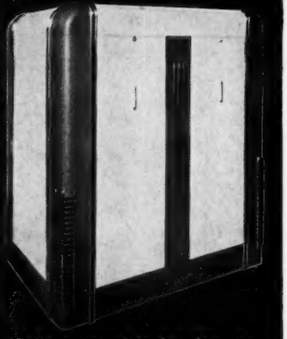
Tailored steel cabinet for hot water heater, especially made for The Ruud Manufacturing Co., Pittsburgh, Pa.



Tailored steel cabinet for hot water heater, especially made for the Lovekin Heater Company, Philadelphia, Pa.



Tailored steel cabinet for gas furnace, especially made for the Richmond Radiator Company, Uniontown, Pa.



Tailored steel jacket for gas furnace, especially made for the L. J. Mueller Furnace Company, Milwaukee, Wis.

STEEL—Tailored To Your Needs

Summer Cooling is now your market

Planoidal Blower Patents 1998184 2048123 Ballentine Capacitor Motor Patent No. 2071224

—*for homes will be cooled with*

GIANT Nite Fans

NOW that the University of Illinois has discovered the way to make NATURE do the work - - - every home owner can afford to have Summer Cooling for the entire house. The average home that could never afford the cost of refrigeration will be cooled with GIANT Nite Fans and that makes summer cooling your market - - - the biggest, fastest selling market you have ever had.

Only Genuine Night Fans *have:*

1. The Patented BALLENTINE MOTORS—Slow speed 8 and 12-pole, direct connected, vertically operating motors specifically developed for this application. The motor that is built for lifetime service (will outlast a dozen ordinary high speed motors); that needs lubrication but once a year; that is almost frictionless for the entire unit operates on a ball bearing. Mounted on sound-insulated pure gum rubber. A Capacitor Motor is the most efficient single phase motor built—saves current.

2. The Patented NOISELESS PLANOIDAL BLOWER has the remarkable static pressure efficiency of 48% in the useful operating range. It is noiseless because the beat frequency of the two blades is well under 30—the minimum audible range of the human ear. The rounded cabinets are employed in the new 1937 models so as to eliminate the air swish resulting from a 4-cornered cabinet.

Easy to Sell—Easy to Install—

send for Demonstrator Today. Get your first installation in now and the first hot spell will make your Summer Cooling headquarters—University of Illinois research data with cooling curves, installation data, etc., sent on request.

Quality is Essential

Unlike ordinary blowers, Nite Fans must be *heavy duty* quality equipment in every way. They must be able to (1) Run continually all night every night through the hot months *without attention* for they are located in inaccessable places. (2) Handle far more air—several times the volume used for winter air conditioning. (3) Be noiseless (4) Be efficient—have an exceedingly low operating cost—should be genuine Nite Fans with the Hold-Heet Planoidal Blower and a Ballentine direct connected, vertically operating slow speed motor.

Catalog No.	Height	Diameter	Capacitor Motor	Planoidal Blower	Control Switch	Top Speed	C.F.M. at .05"	C.F.M. at .10"	C.F.M. at .15"	Shipping Weight	List Price
NO1	17"	30¼"	1/6 h.p. 8-pole	23"	100 speed	820 r.p.m.	2,800	2,500	2,100	110 lbs.	$98
NO7	22"	48⅜"	1/2 h.p. 12-pole	36"	8 speed	550 r.p.m.	10,000	7,700	6,600	315 lbs.	$248

ALSO PORTABLE NITE FANS FOR: OFFICES, APARTMENTS, HOTELS, STORES, ETC.

RUSSELL ELECTRIC CO., *Mfrs.* 342 W. Huron St. Chicago, Illinois

In This Issue

The shortage of good mechanics has become a problem of major importance in many areas. And as in most things we begin now to talk about apprentice training when we should have started training young men five years ago. But because we can only do now as best we can, the program of training in Toledo, Ohio (page 20) is particularly timely.

★

R. F. Jeske continues his case examples of material collecting, separating and exhausting, on page 22 with an article describing a double hood for a furnace in a brass foundry. The drawings show exactly how the equipment was designed and installed. Mr. Jeske will answer questions.

★

In Oshkosh, Wisconsin, the business records of the C. F. Warning Co. are kept by a young lady thoroughly grounded in our industry and in cost accounting. Her method of keeping track of all the details of the Social Security records is related and shown on page 26. The system developed seems to have many good points for the larger shop.

★

The Better Weather Protection series—this time covering Ridges—appears on page 28. As usual, several drawings tell the story far more clearly than words.

★

J. G. Dingle offers some timely advice on page 31. His topic is meeting the competition of the itinerant contractor. Know one such? Or the high pressure manufacturer who wants you to sink your whole business in his pool of rosy promises? If you want to read a bit of advice this is your article.

★

On page 57, S. Konzo brings to a close his series of unusually interesting articles on various types of duct distribution systems. This article covers high velocity jobs. Beginning with June, Mr. Konzo will begin cooling and explain exactly what we know about the different methods.

★

On page 59 William Neubecker continues his series on patterns for air conditioning fittings and on page 62 M. Fahnestock continues his paper on cooling research in our research residence.

★

An unusually interesting and timely article deals with the effect of air conditioning (mainly filtering) on hay fever and asthma pollen. With the season beginning with summer for some forms of this ailment, the results of the careful tests related are of definite value. See page 67.

AMERICAN ARTISAN

With which is merged

FURNACES and SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor — Brewster S. Beach, Consulting Editor

Vol. 106, No. 5 — May, 1937 — Founded 1880

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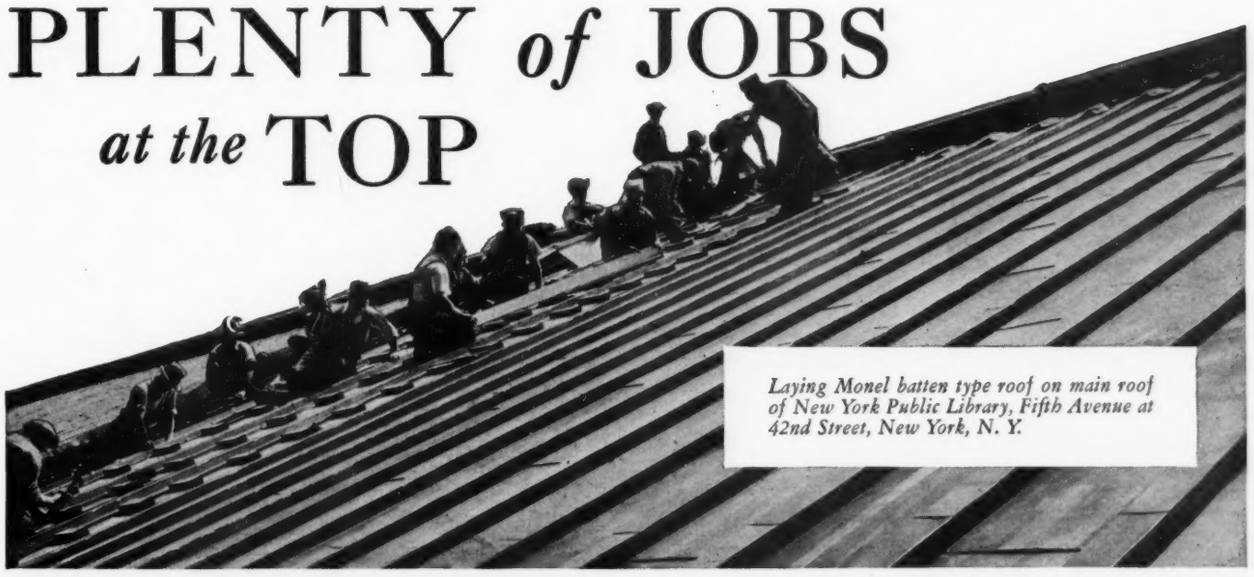
More than 8,000 Copies of this Issue are being distributed

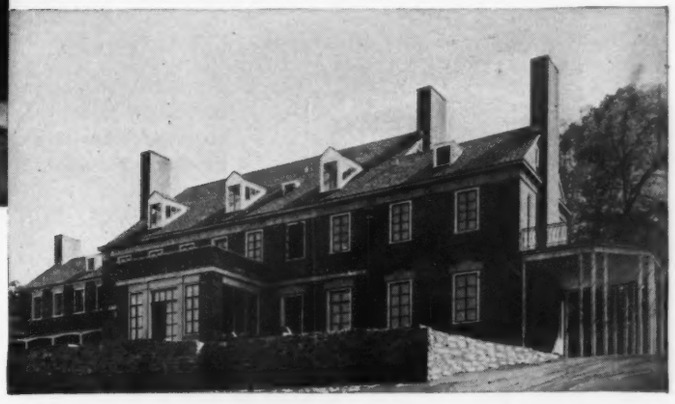
There are PLENTY *of* JOBS *at the* TOP



Laying Monel batten type roof on main roof of New York Public Library, Fifth Avenue at 42nd Street, New York, N. Y.

(Left) Installing scuttle entrance of Monel on wing D on roof of Brooklyn Museum, Brooklyn, N. Y. Contractor—Co-operative Sheet Metal Works.

(Below) A residence in Riverdale, N. Y., with Monel leaders, wainscoting, gutters, and ornamental work installed by Roth Roofing Co., Yonkers, N. Y.



You CAN *sell* Monel Roofs

. . . but you've got to be able to see things in a big way to land big jobs

LOOK over the buildings shown here. Their roofs are Monel.* They run into important money. And by the same token, they pay important profits.

But no contractor with the "tinker" point of view can land such jobs. It takes broad gauge vision to see what kind of jobs *need* Monel roofs: Museums, art galleries, big banks, city, country, state and federal buildings, colleges, churches, and a few better class homes.

But the *move* is all towards Monel. If you know of any buildings like those listed above where the old roofing material has failed . . . buildings where you think you *might* sell Monel with some help from us . . . write us. There are lots of ways we can lend you a hand. See if we can't be of service to you. Write to

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street **New York, N. Y.**

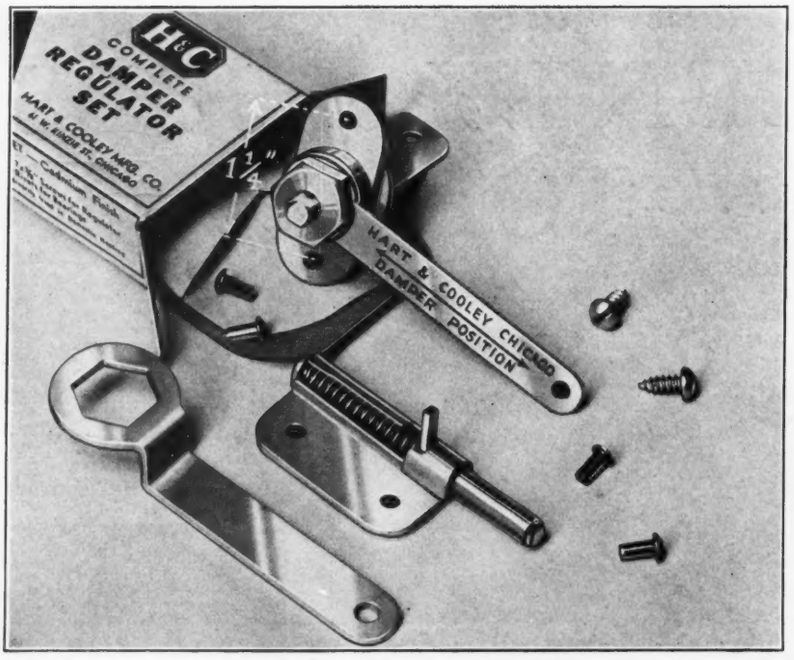
*Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled, and marketed solely by International Nickel.

On the Metropolitan Museum of Art, New York, N. Y. Monel standing seam roof, gutters, flashings, installed by J. J. Fisher Co., New York, N. Y. The Monel gutter is hung by Monel brackets.

INCO MONEL

MONEL

Have You Tried the New H&C DAMPER REGULATOR SETS?



No. 50¼ Set (¼" bearing) illustrated above. Set No. 50⅜ (⅜" bearing) is furnished with solid end bearing.

You'll Like them Immensely!

Neat and secure installations are automatically assured through the use of the new H & C Damper Regulator Sets. They're sturdily built to give lasting satisfaction and exceptionally convenient to use. Note below the numerous advantages incorporated in their design and construction.

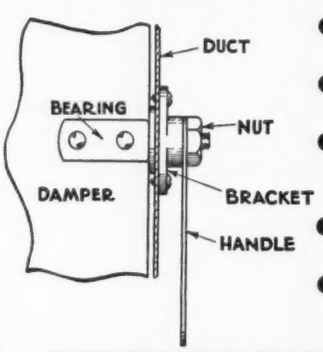
¼" SNAP END BEARING A REAL CONVENIENCE

No. 53¼ Snap Bearing is regularly furnished with No. 50¼ Set and is also available separately. The bearing consists of a pin sliding in a sleeve with a spring to force the pin outward. When the damper is being installed, the pin recedes into the sleeve until it is opposite the hole in the duct, when it snaps into the hole. A quarter-turn fastens the pin in place: a decided advantage since even the smallest dampers can be installed without bending.

All bearings are made of steel and are equally adaptable to both splitter and regular dampers.

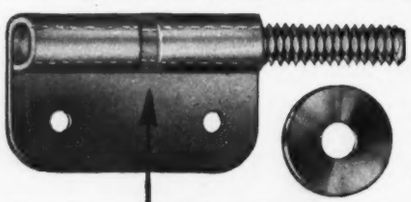
All sets are furnished complete with parts as shown. Wrench for tightening nut is furnished with each package of 12 No. 50¼ Sets—6 No. 50⅜ Sets.

Your Jobber has them



- Damper is held securely against both turning and end play, thus eliminating all vibration.
- Handle may be removed after adjustment of damper, if desired, preventing tampering with damper.
- Handle rotates in complete circle, permitting installation of regulator in any position. Handle always indicates position of damper.
- Compact design of bracket permits installation near edge of duct and on either round or flat duct.
- Bearings, handle, screws, and nuts are Cadmium-plated and bracket is die-cast, thus preventing rust.

A PERFECTED THREADED BEARING



UNBREAKABLE SHANK is one solid piece of steel—CASE HARDENED to prevent wear—thus insuring permanently tight fitting handle.

Shank is rigidly clinched in place—Detachable washer permits quick, convenient riveting.

HART & COOLEY MANUFACTURING CO.

Warm Air Registers
Damper Regulator Sets
H&C
Air Conditioning Grilles
Dampers, Chain, Pulleys

61 W. KINZIE STREET, CHICAGO, ILLINOIS

ENGINEERING OFFICE AND FACTORY · HOLLAND · MICH·

Also Angles, Channels, Bolts, Rivets, Welding Rod and all other Steel Products for the Sheet Metal Worker

including—

Channels, Angles
Tees and Zees
Plates, Sheets
Strip Steel
Flat Wire, Etc.
Stainless Steel
Hot Rolled Bars
Hoops and Bands
Rivets, Bolts
Nuts, Washers, Etc.
Solder, Flux, Etc.
Expanded Metal

Immediate Shipment Assured

Ryerson Sheets—more than twenty-five kinds—are but one unit of the wide range of stocks carried for Immediate Shipment. There is hardly a product in the finished steel and allied lines that you cannot secure at once from the nearest Ryerson plant.

Special handling, cutting and dispatching facilities and an experienced organization assure prompt shipment of your order.

Concentrate your purchases through this one reliable source and save time, trouble and money.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

RYERSON

Your Best Advertisement—
A PERFECT ROOFING JOB!

Anaconda Economy Copper Roofing gives it to you

HOUSE BEAUTIFUL
164
Of what other roof CAN ALL THIS BE SAID...
—it is Anaconda Copper... and moderate in cost.
—its appearance actually improves with age and service.
—it is durable through the years... time-proof and weather-resistant.
—it is fire-safe... Copper protects the home from flying sparks.
—it is water-tight... protects cellular insulation against loss of efficiency due to moisture.
ANACONDA
Wedgwood for the Coronation. Medallions of the King and Queen or their monogram on dark blue ground
DISPATCHES
NO excuse NOW to roof your home with anything but the best! The new lower cost of Anaconda Copper Roofing transforms it from a "luxury" to a roof that thousands can afford.
This roofing of genuine Anaconda Copper is lighter in weight (10 ounces per square foot) and comes in narrower sheets than the copper so popular for roofing monumental buildings. The reduced space between standing seams conforms to residential lines, and provides approximately the same rigidity and wind resistance as wider sheets of heavier metal.
Because of this design, you now get the permanence of copper for a price never before possible. Take advantage of this opportunity. For your home get the roof that has *everything*—beauty with durability, economy with safety.
Ask your architect or builder about Anaconda *Economy* Copper Roofing. Competent sheet metal craftsmen everywhere are equipped to install it. Our special booklet, C-7 is free.
Anaconda Copper
THE AMERICAN BRASS CO., General Offices: Waterbury, Conn.
Offices and Agencies in Principal Cities. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

New prospects for copper roofing contracts are being developed by Anaconda advertising

This high grade, moderately priced copper roofing offers sheet metal men a splendid opportunity to get profitable residential roofing business. No other material offers so many distinctive features. The chief advantages are listed in the current magazine advertisement shown here.

This is one of a series of advertisements appearing in "House & Garden", "House Beautiful", and "Town & Country" telling the thousands of home-builders everywhere about Anaconda *Economy* Copper Roofing. Are you in position to benefit from the business this advertising produces?

Anaconda distributors stock Anaconda *Economy* Copper Roofing for immediate delivery. It is packed flat in crates containing sufficient copper (48 sheets) for 3 squares of roof area. The strips are 16 inches wide and 6 feet long. Weight of copper is 10 oz. per square foot, subject to standard manufacturing tolerance. *Write for full information . . . address*

ANACONDA
from mine to consumer

THE AMERICAN BRASS COMPANY
Waterbury, Connecticut

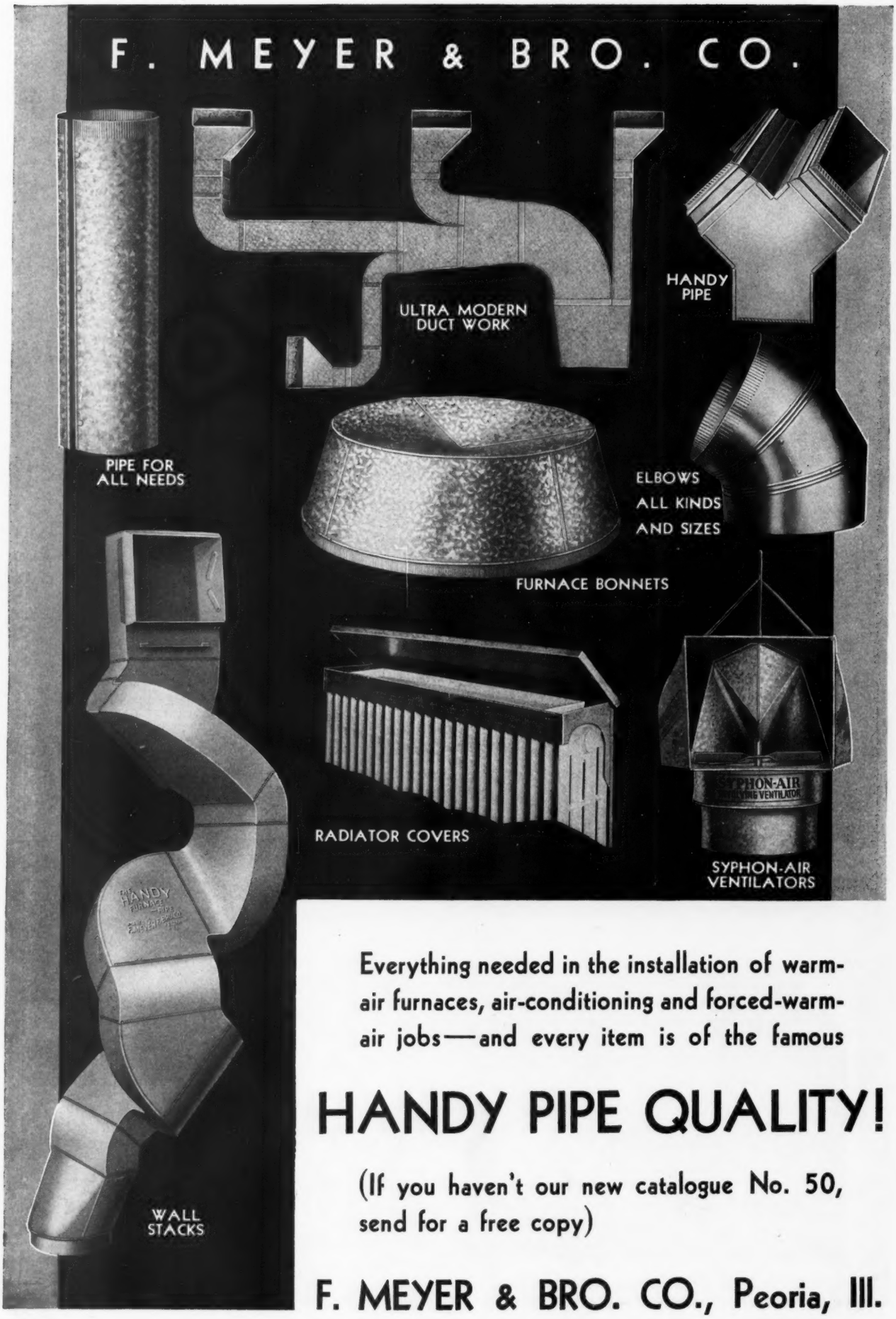
87229

A GOOD REPUTATION is a continually expanding reputation. A growing reputation results from work well done, and from association with that which performs a useful, satisfying service. Niagara heating units establish the reputation of dealers who install them, as expert mechanics in the business of heating homes. Niagara Gravity Furnaces and Winter Air-Conditioning Units can be counted upon to enlarge your field of usefulness because each installation is certain to lead to others in your neighborhood, if neighbors exchange experiences, as neighbors usually do.

Realize the earnings that can come directly to you as a result of tieing up with the established reputation of Niagara heating units. Ask us about how to associate your business with Niagara Furnaces and Winter Air-Conditioning Units.

THE FOREST CITY FOUNDRIES COMPANY
25 West 27th Street • Cleveland, Ohio

NIAGARA
COAL, GAS and OIL-FIRED
WARM AIR FURNACES and
AIR-CONDITIONING UNITS.



Everything needed in the installation of warm-air furnaces, air-conditioning and forced-warm-air jobs—and every item is of the famous

HANDY PIPE QUALITY!

(If you haven't our new catalogue No. 50, send for a free copy)

F. MEYER & BRO. CO., Peoria, Ill.

"... and the Walls came *tumbling* down!"

REMEMBER reading how Joshua and the priests of Israel marched around the walls of Jericho for seven days? How they blew their trumpets as the people shouted? And how the walls came tumbling down?

We'd like to blow our trumpets—calling all sheet metal workers. We have an announcement... a trumpet call that means business for you... and that may tear down some "walls" for you—the walls between you and increased sales.

From now on, when you buy steel sheets made by one of the United States Steel Corporation Subsidiaries, they will be stamped with a new trade-mark. A mark consisting of the three letters USS enclosed by a circle.

From now on, the letters USS will be as well known by millions of consumers as a brake is to a sheet metal worker... because of an intensive campaign advertising all kinds of USS products and grades... sheets, plates, wire, stainless, high tensiles... steel of all kinds.

From now on, your customers will ask for products made with USS Sheets... with better steel.

From now on, your business will be better... because the *forming qualities* of USS Sheets make your work easier... because the letters USS mean *uniformity* in gauge, size, strength and durability... because your customers will be satisfied... satisfied with the jobs you do... satisfied with the price you ask... satisfied with the long life of the steel you use.

Why don't you ask your jobber for USS Copper Steel Black and Galvanized Sheets?... He has them in the type you need... for maximum service at a reasonable cost. A little copper goes a long way.

U·S·S BLACK *and* GALVANIZED SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION · *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY · *San Francisco, California*
TENNESSEE COAL, IRON & RAILROAD COMPANY · *Birmingham, Ala.*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

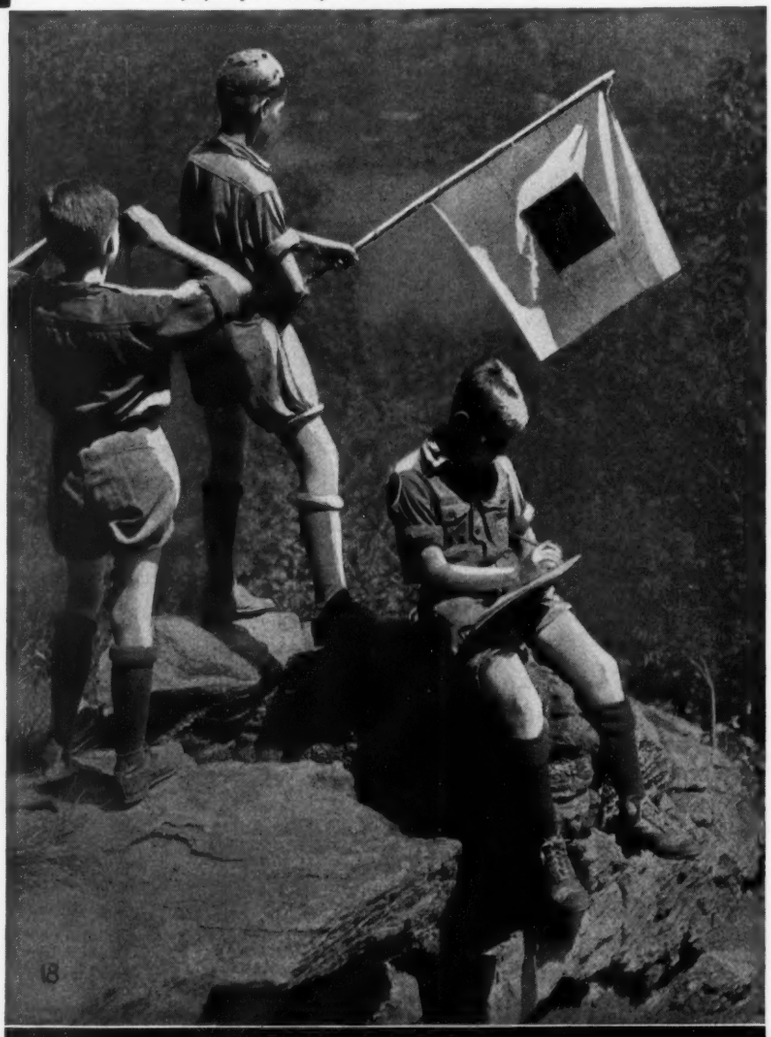
"BE PREPARED"

THIS motto, familiar to every Boy Scout, is sufficient to insure any boy's success if he will only follow it. Being on the job and ready for it is half the battle, regardless of one's age.

Right now, we are on the threshhold of another season. It should be a busy and profitable one. But what each one of us makes of it depends chiefly on whether he, or someone else, is better fitted to handle the business.

Be prepared. If you have not already done so, check carefully your list of prospects, your stocks, your shop tools and equipment. As you do these things, please bear in mind that OSBORN is prepared to serve your every need from a stock which is larger and more complete than in many years.

Photo courtesy of Boy Scouts of America.



Asphalt—roofers
Blowers
Canvas
Ceiling—steel
Conductor Pipe
galv. steel, Armco iron, copper, 40 lb. terne
Controls
automatic heating
Eaves Trough
see conductor pipe
Fans
furnace, exhaust, propeller
Furnace Pipe and Fittings
Furnaces
Grilles
Gutter, O. G.
see conductor pipe
Hangers
eaves trough and gutter
Hooks
conductor pipe and flashing
Humidifiers
Machinery
hand, foot and power
Nails
Paints
tinner's red and house paints
Paper
asbestos, red rosin, building, asbestos mill board
Registers—warm air
Ridge Roll
Roofing
asphalt in rolls and shingles, felts, asbestos siding, roofers supplies coatings
Roofing and Siding
galv. steel, Armco iron, copper, ternes
Roofing Ternes
40 lb. and 25 lb. in IX and IC
15 lb. and 8 lb. IC
roll tin IX and IC
Screws—sheet metal
Sheets
aluminum, steel, iron, copper, zinc, stainless, long terne, enameling
Sheets (Corrugated)
Sheets (Perforated)
Sheets (Plated)
chrome and nickel plated zinc, copper, tin and steel
Siding
galv. and painted
Solder and Fluxes
Tin Plate
charcoal, cokes, imported dairy, roofing ternes
Tools
every kind used in sheet metal
Ventilators
roof and fan
Welding
equipment and supplies; both arc and gas

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO—CLEVELAND—DETROIT
A Dependable Source of Supply for 79 Years

YOUNGSTOWN

MEETS A THREE WAY RESPONSIBILITY

★In the manufacture of Galvanized Sheets YOUNGSTOWN recognizes three responsibilities--to the architect, to the contractor, to the building owner.

★To protect the Architect we see to it that YOUNGSTOWN Sheets maintain an unvaryingly high standard of quality so that "YOUNGSTOWN" may always be specified with complete confidence.

★To protect the Contractor we make sure that YOUNGSTOWN Sheets possess the qualities of workability and easy forming which keep installation costs low.

★To protect the Building Owner we use every manufacturing precaution....in the production of the steel itself, in the rolling of the sheets and in the operation of the galvanizing process....which can contribute to insure long trouble-free service.

★Architect, contractor, and owner all benefit when YOUNGSTOWN Galvanized Sheets are delivered to a job, because YOUNGSTOWN Sheets mean

"Satisfaction to all concerned"

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

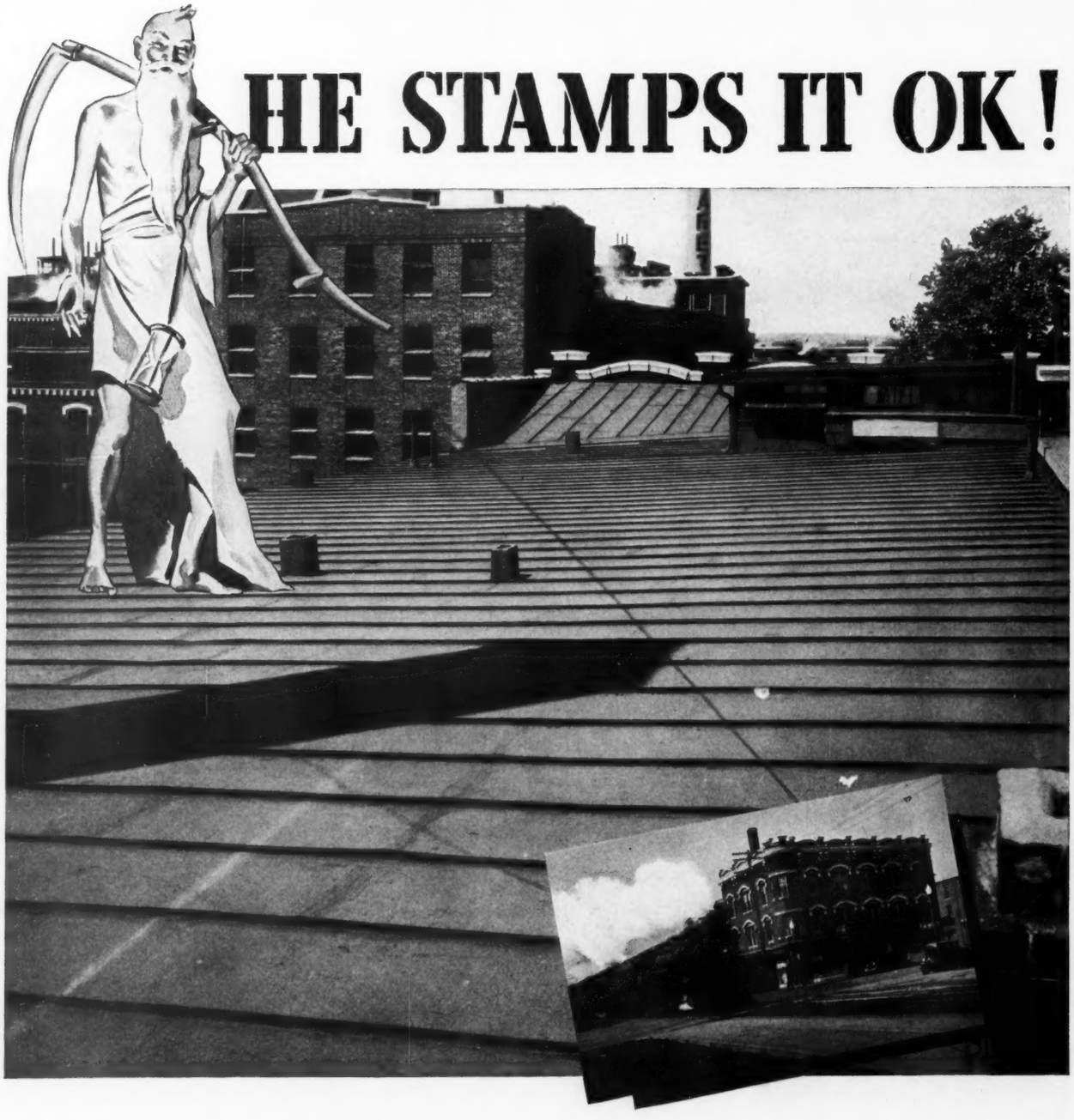
General Offices - - - YOUNGSTOWN, OHIO

Sheets; Plates; Pipe and other Tubular Conduit; Tin Plate; Products; Bars; Rods; Wire; Nails; Unions; Tie Plates and Spikes.

674

GALVANIZED TRADE MARK YOUNGSTOWN SHEETS

HE STAMPS IT OK!



This ARMCO Ingot Iron roof wins full approval from Old Man Time. It was installed in 1909 on this apartment building next to a main-line railroad. Industrial plants in the immediate neighborhood contribute to the corrosive atmosphere. For twenty-six years the Ingot Iron roof has withstood these extremely severe conditions and when recently inspected was found to be in first-class condition.

Evidence like this can be a great help to you in selling sheet metal work. It gives your prospects confidence to buy ARMCO Ingot Iron. It is the only low-cost metal with such long-established records of actual service. Here are convincing talking points that win sales—quicker, easier, more profitable sales.

Call the nearby Armco Distributor for fast delivery of that next sheet metal order. He has ample stocks of galvanized ARMCO Ingot Iron. And ask him to tell you about the tested selling aids he offers free. The American Rolling Mill Company, Executive Offices, Middletown, Ohio.

★ ARMCO

ARMCO INGOT IRON

Confidence BUILT ON SERVICE

Saved

HAYNES MANUFACTURING COMPANY
MANUFACTURERS
WIRE GARMENT HANGERS
7218 W. 37th St. - - Phone Taylor 3026
HOUSTON, TEXAS

March 15, 1937

Mr. G. C. Steffen,
Wessendorff, Nelms & Co.,
317 Preston,
Houston, Texas.

Dear Mr. Steffen:

We have had our new General Electric Mutator Arc Welder in use for about three months. Since installing it, I have welded various thickness of metal; some as light as twenty-four gauge and find that this arc welder works better than any other welder I have ever used. In other words, I can cut the heat down and still strike an arc without the slightest difficulty.

I welded the angle iron framework of my new truck body with this welder and on this one job, saved enough money to pay for my welder.

Yours very truly,

E. I. Haynes

EIHaynes:AB

On this one job of building a truck body for its own use, the Haynes Manufacturing Company saved enough money to pay for its new G-E Mutator arc welder

ENOUGH ON ONE JOB TO PAY FOR WELDER

THAT'S what Mr. E. I. Haynes, President, Haynes Manufacturing Company, Houston, Texas, writes after using his new G-E MUTATOR ARC WELDER for three months. "Works better than any other I have ever used . . . I can cut the heat down and still strike an arc without the slightest difficulty," he continues enthusiastically.

Outstanding for Light-gauge Welding

Mr. Haynes' experience is typical of that of hundreds of progressive manufacturers and other users who are using this new low-current arc welder, built especially for light-gauge fabrication and repair work. Results in case after case are proving it to be the outstanding low-current d-c welder in its field.

With this G-E Mutator arc welder, you can get superior results and remarkable savings when welding anything from thin-gauge sheet up to 1/4-inch sections. Excellent stability makes the arc especially easy to strike and maintain on low currents—operators call it the "soft" arc.

Investigate the G-E MUTATOR

If your fabrication or repair work involves light-gauge metals, it will pay you to get further information. We suggest that you get in touch—NOW—with the nearest G-E welding distributor or G-E sales office, or fill in the coupon and return it to us. General Electric Company, Schenectady, N. Y.

The Mutator arc welder is recommended for trailer-body fabrication and repair, metal furniture manufacturing, and in plumbing shops, ornamental-iron works, job shops, and wherever light-gauge metal is fabricated

140-48

GENERAL ELECTRIC

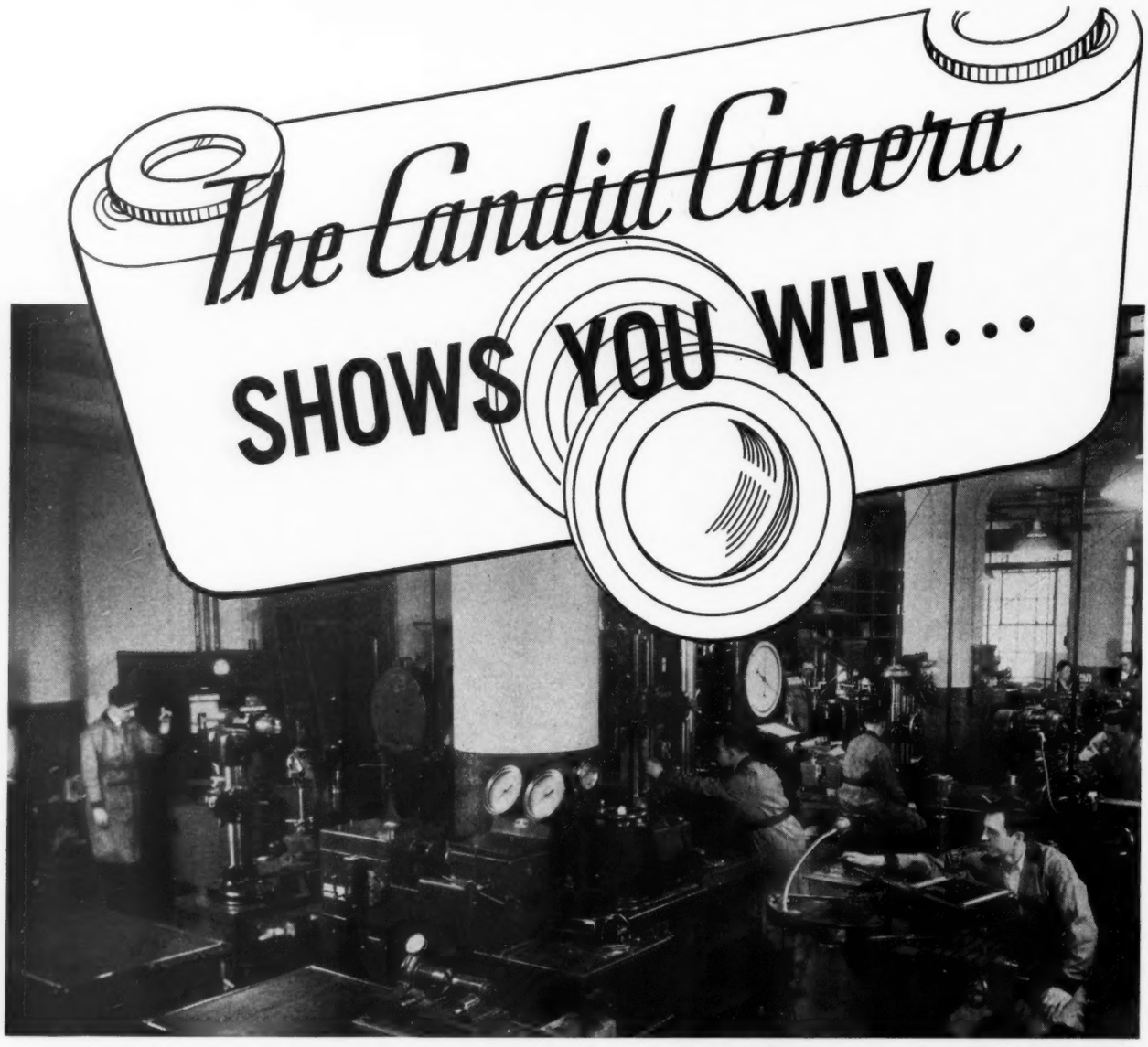
General Electric, Dept. 6B-201, Schenectady, N. Y.

Send me the complete description of the new General Electric light-gauge-metal welder which has made such remarkable savings for Mr. Haynes. (GEA-2447C)

NAME..... *FIRM*.....

STREET..... *CITY*.....

STATE.....



—it pays to get genuine Parker-Kalon Sheet Metal Screws

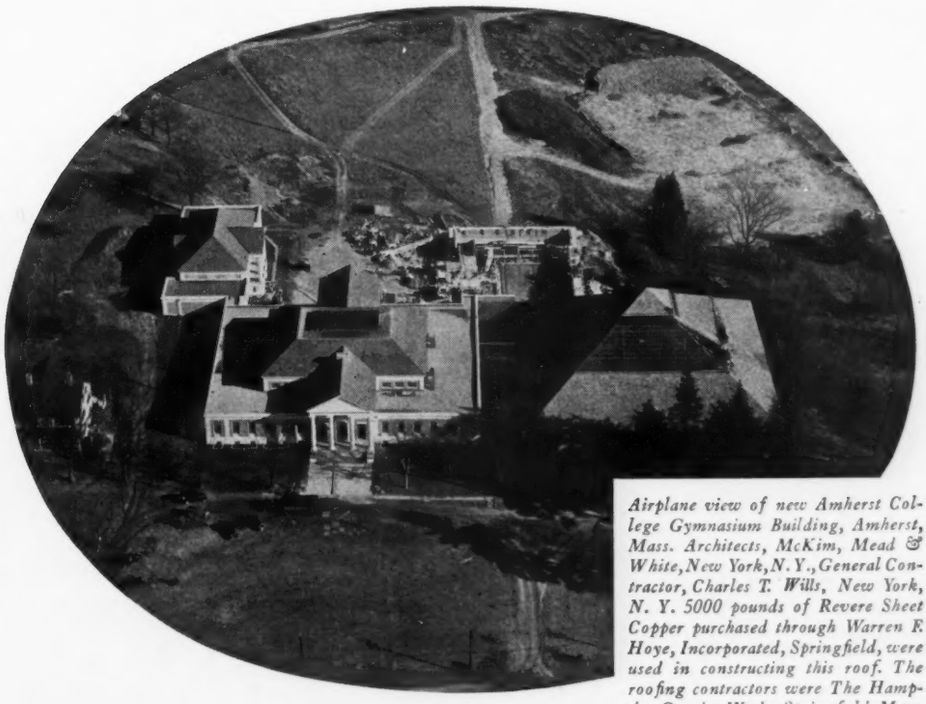
Many sheet metal workers have wondered why it is that genuine Parker-Kalon Sheet Metal Screws give UNIFORMLY PERFECT RESULTS in contrast to the uncertain action of imitations that "look" the same. Here you see one of the major reasons . . . the famous Parker-Kalon Laboratory. Nothing to even compare with this equipment for securing and controlling the essential qualities of screw products has ever been known in the industry. It cost a fortune to establish. But it is worth a fortune to you who buy screws to cut costs in assembling sheet metal. Added to Parker-Kalon's experience of over 20 years in making Sheet Metal Screws, this master control over quality ASSURES you of fastening economy.

Remember that Parker-Kalon Sheet Metal Screws are made to "work" right every time . . . a necessity for consistent savings of assembly time and labor. *They always hold* because the threads run full diameter right to the head. They *always go in easily* because the threads are designed with expert knowledge of the work they must perform and held to a high degree of uniformity. *Their threads don't strip, nor do the heads twist off* because they are made from a special analysis wire and are hardened by an exclusive process developed from 20 years' experience in making Parker-Kalon Self-tapping Screws.

PARKER-KALON CORP., 190 Varick St., New York

PARKER-KALON PRODUCTS ARE SOLD ONLY BY RECOGNIZED DISTRIBUTORS

"TOPS" *for* TOPS



Airplane view of new Amherst College Gymnasium Building, Amherst, Mass. Architects, McKim, Mead & White, New York, N. Y., General Contractor, Charles T. Wills, New York, N. Y. 5000 pounds of Revere Sheet Copper purchased through Warren F. Hoye, Incorporated, Springfield, were used in constructing this roof. The roofing contractors were The Hampden Cornice Works, Springfield, Mass.

As a protective roof material, copper is "tops."

That is why 5000 pounds of Revere Sheet Copper were included in roofing materials used for the big new Gymnasium Building of Amherst College, Amherst, Mass. Also a new swimming pool is being constructed, for which 8000 pounds of Revere sheet copper will be used. College buildings must last; college incomes must nip up-keep expense; and plenty of rust-proof Revere copper helps to do this. In all types of building and modernization projects, better materials and higher construction standards are demanded today. This applies not only to large jobs but to small homes, as well. Architects, national magazines and newspapers are helping to stimulate this demand by educating building owners, investors, building operating companies and home-buyers.

Take advantage of this trend by pushing these high-grade materials:

CHENEY FLASHING	REVERE THRU-WALL FLASHING	REVERE SHEET COPPER	REVERE LEADTEX
The standard through-wall flashing that makes a dependable key-bond in all directions, assures proper drainage, and provides for expansion and contraction.	An excellent through-wall flashing at a moderate price. Bonds in all lateral directions. Comes in flat sheets. Easily cut and formed.	Easily worked. Popular for roofing, flashing, gutters, downspouts, skylights, cornices, etc. Hard or soft tempers. Various finishes.	Sheet copper lead-coated by a special Revere process that assures uniform thickness and tenacious adhesion of the lead.

Ask your distributor for these Revere products. For information and specifications, write our Executive Offices, 230 Park Avenue, New York City.

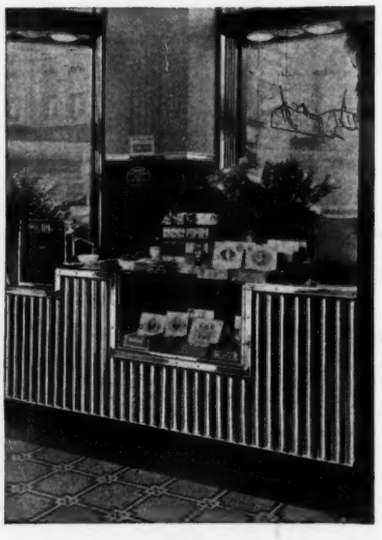
Revere Copper *and* Brass

INCORPORATED

FOUNDED BY PAUL REVERE 1801

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY · MILLS: BALTIMORE, MD. · TAUNTON, MASS. NEW BEDFORD, MASS. · ROME, N. Y. · DETROIT, MICH. · CHICAGO, ILL. · SALES OFFICES IN PRINCIPAL CITIES

EXTRA BUSINESS IS IN THE Bag



• Every day, some sheet metal contractor is asked to bid on a job involving the use of stainless steel. It may be your turn tomorrow. Will you be prepared to take this profitable business?

You will if you tie up with ENDURO, Republic's Perfected Stainless Steel. ENDURO is a beautiful, lasting metal, available in a wide variety of finishes, analyses and forms. It is resistant to all types of corrosion. It retains its lustrous finish for a lifetime.

And, probably of maximum importance to you, ENDURO is easy to fabricate with modern sheet metal working equipment.

Other sheet metal contractors are using ENDURO to obtain their share of stainless business—why not you? Write for information.

REPUBLIC STEEL

ENDURO

REPUBLIC'S PERFECTED STAINLESS STEEL

You see ENDURO wherever you go. In this modern restaurant it is used for column flaring at ceiling, for counters, canopy, kitchen tables, trays and pans.

Republic Steel Corporation

GENERAL OFFICES . . . CLEVELAND, OHIO
ALLOY STEEL DIVISION . MASSILLON, OHIO

When writing Republic Steel Corporation for further information, please address Department A.A.

AMERICAN ARTISAN

Volume 106 Number 5

Codes and Licensing

The warm air heating and air conditioning industry in Fort Wayne, Indiana, has been working for months to secure passage of an installation code and licensing agreement covering the design and installation of gravity and mechanical warm air heating systems, gas or oil burners and stokers. The suggested code has been presented to the city council, which in turn referred the matter to a committee.

The code was practically passed when the plumbers entered a protest claiming they should install all the piping used with oil burners or air conditioning apparatus. At the same time the electricians protested the bill claiming they should install all the wiring of thermostats and other control instruments. With these objections in mind the council failed to act on the measure until these disputes are settled.

The warm air heating contractors backing the ordinance admit that the plumbing work probably may be under the installation of the plumbers, but the warm air heating contractor should sublet such work. On the other hand, the warm air heating contractors do not see any justification for electricians wiring between control instruments so long as the electricians bring in the power line to the switch box. The warm air contractors further claim that if a contractor is qualified under the proposed act to design and install an air conditioning system he certainly should be qualified to do the electrical wiring between controls.

The warm air contractors also contend that in view of the fact that the operation of the system is guaranteed and must be serviced by the heating contractor, the vital matter of proper control operation must also be with the heating contractor and, therefore, he should have the privilege of doing this wiring with his own men or sublet the wiring under his supervision if he so desires.

In view of the fact that this matter of jurisdiction is still under discussion, the Fort Wayne association will appreciate any comments by associations or individuals who have already had this matter satisfactorily settled. Charles E. Tharp, the secretary, 3509 South Harrison Street, Fort Wayne, is the clearing house for all information.

This entire proposition of codes and licensing seems to be gaining increased interest and momentum. Numerous communities, through associations or individuals, have stated to us that codes to control the design and installation of air conditioning systems through examination as to fitness, the establishing of financial responsibility, through inspection to see that the provisions of the code are lived up to under penalty of revocation of the license, are being seriously considered and action may be taken.

Generally, these measures are being considered because other attempts to control design, installation and responsibility, such as education, association organization and so forth have proved too slow or not drastic enough. A code setting up minimum standards of design and installation, coupled with licensing to see that the code is lived up to, seems to be all that is left to try.

◆

It's Your Move

Last month under this title "It's Your Move" we offered the suggestion that the time has come when the warm air heating contractor should give serious consideration to the proposition of adding automatic firing devices to his line of apparatus in order to offer the customer a complete heating or air conditioning service.

A contractor said a few days ago that this suggestion was all right in theory, but impractical of application because such a practice would mean adding men and equipment to maintain a 24-hour service department. Also, that such service is expensive and reduces the profits. And, further, that more business can be done and more certain and substantial profits made by concentrating on the fabrication and installation of the metal work and installing the furnace with any firing device.

It would seem that this theory of making substantial profits from the metal work alone has been pretty well exploded by facts gathered during the past two years showing that profits are not substantial on metal work alone. And, also, that the firing device agency is not content to sell the burner alone, but now wants to sell the heating equipment as well. That this trend is bound to increase is shown by the number of burner agencies now offering a furnace-burner unit. Also, we know with fair certainty now, that prices of metal work alone are bound to feel the constant hammering for lower prices under competitive bidding.

With the margin of profit on metal work growing smaller, it seems to us that the only alternative lies in selling the customer the whole job.

The Toledo Plan for Sheet Metal Working Apprenticeship

Purpose of This Plan

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2. To raise the standard of the entire craft by assuring, for the future, a high quality of journeymen and to encourage and assist present journeymen to upgrade themselves by means of available educational opportunities.

Derivation of This Plan

This plan was devised through the interested activity of qualified representatives of employers, employees, and the public schools.

Apprentice Committee

A. Authority

The initiation and administration of the apprentice program shall be vested in a Committee called "The Toledo Sheet Metal Working Apprentice Committee," with the approval of the State Committee on Apprentice Training.

B. Membership

This "Committee" shall be composed of seven (7) members. These members shall be selected from and by the representative bodies concerned, as follows:

Three (3) representatives from the Toledo Sheet Metal & Roofing Contractors' Association.

Three (3) representatives from the Sheet Metal Workers' Union, Local No. 6.

One (1) representative of the public schools, who shall be the Director of Vocational Education or whom he shall designate. This representative shall be without vote.

Additional members may be secured, but tenure should be so arranged that equal representation from employers and employees is constant.

C. Organization

This "Committee" shall elect a Chairman and a Vice-Chairman. It shall select a Secretary, who need not be a committee member. It shall adopt rules and regulations, fix times of meeting, and carry on the duties and functions mentioned in this "Plan."

D. Functions or Duties

This Committee is charged with the following duties in addition to those specifically mentioned elsewhere in this "Plan."

1. To receive applications and keep a registry of candidates for apprenticeship.
2. To maintain a cumulative record for each apprentice over the period of apprenticeship.
3. To investigate the credentials of candidates and make recommendations to prospective employers on the facts thus secured.
4. To establish rules and regulations regarding this program and enforce them.
5. To arbitrate differences concerning apprentices.
6. To cooperate with the Board of Education in the establishment and outlining of related instruction, in the construction of suitable application forms, works progress records, related instruction attendance notices, etc.
7. To establish minimum standards of proficiency to be met by the apprentice in the skills of the job or the shop, and to periodically examine apprentices to measure progress in meeting the standards.
8. To decide on a sound apprentice agreement, with the approval of the State Committee on Apprentice Training.
9. To arrange for transfer of apprentices when and if necessary.
10. To keep the State Committee on Apprentice Training informed of activities through regular reports.

Functions of Agencies Working With Committee

A. Toledo Board of Education

The Board of Education will:

1. Adhere to and carry out the Provisions of the State Plan referring to Part Time Trade Extension for Apprentices.
2. Employ and pay competent instructors and coordinator properly certificated according to State regulations.
3. Assume, through its Department of Vocational Education, the supervision and coordination of the related instruction and the immediate direction of the coordinator in the fulfillment of his duties.
4. Provide suitable classrooms and facilities in the public schools in which to conduct classes in related instruction.

B. State Board for Vocational Education

The State Board For Vocational Education will:

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2. Reimburse the Board of Education for that portion of the wages of the Instructors and Coordinator as provided in the agreement with the Board of Education.
3. Provide necessary Teacher Training through cooperative agencies.
4. Issue certificates of proficiency to the qualifiers.

C. The State Committee on Apprentice Training

The State Committee on Apprentice Training will:

1. Supply, on request, approved apprentice agreement blanks, identification cards, and arrange for suitable diplomas or certificates.
2. Register apprentices by means of copies of the apprentice agreements properly filled out, and act as a third party in signing such agreements.
3. Act as a board of appeals if the Toledo Committee desires to refer problems to it.
4. Provide the services of the Field Representative.

Apprentice Regulations

Although it is expected that the Toledo Sheet Metal Working Apprentice Committee will establish additional rules and regulations from time to time, the following items were considered as necessary to define the program:

A. Qualifications

1. **Age**—minimum, 16 years.
2. **Education**—Applicant must be of normal mentality and have completed high school or its equivalent. This is not to construe against the youth having unusual aptitude for mechanics, who, for some reason beyond his control, has been unable to complete high school.
3. **Physical Fitness**—The applicant must possess a physical development sufficient to enable him to perform all of the physical duties of the craft.
4. **Civic and Social Attitude**—Applicant must possess a good character and reputation in the community.
5. **Applications**—Applications from persons wishing to become apprentices and applications from employers wishing to have apprentices will be filed with the Toledo Sheet Metal Working Apprentice Committee.

B. The Apprentice Agreement

1. All apprentices accepted under this "Plan" must be properly indentured by means of the apprentice agreement appended to this Plan (See Exhibit 1).
2. In addition to the apprentice agreement there shall be provided a personal record on which shall be entered by

the Secretary of the "Committee" all data during the term of apprenticeship.

3. The following shall receive copies of the apprentice agreement properly filled out:

a. The Apprentice.
b. The Employer.
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d. The State Committee on Apprentice Training.
e. The Coordinator of Apprentice Training.

C. Length and Details of the Period of Apprenticeship

1. The period of apprenticeship shall be four years (4) of reasonably continuous employment, or 8,000 hours. In addition to the above there shall be at least 768 hours of related instruction. The total of hours thus included shall be 8,768.

2. The first six calendar months of the period of apprenticeship shall be a period of probation.

3. A credit allowance toward completion of the period of apprenticeship shall be given for previous experience or training. The "Toledo Committee" shall determine the amount of credit so given.

4. All hours of overtime shall be duly credited toward completion of the period of apprenticeship.

5. All time lost during any six months period must be made up before an apprentice can advance to the next higher six months rating.

6. Transfers—An apprentice may be temporarily "farmed out" by mutual agreement between the employers and the "Toledo Committee." In such cases the new, or second, employer must assume all the obligations of training, wages and schooling during the period of temporary employment. Transferred apprentices shall carry an identification card indicating that the transfer is permissible.

D. Wages of Apprentices

1. Included in the Apprentice Agreement (See Exhibit 1) shall be a graduated wage scale which shall be established and maintained on the following percentage basis of the established wage rate of journeymen Sheet Metal Workers (overtime shall be determined likewise):

Period	Rate	Period	Rate
1st 6 months.	30%	5th 6 months,	50%
2nd 6 months,	35%	6th 6 months,	60%
3rd 6 months,	40%	7th 6 months,	70%
4th 6 months,	45%	8th 6 months,	80%

2. Bonus—Gifts of hand tools and a cash bonus may be provided by the employer or the Union, or both, as a reward for progress, or for completion of the period of apprenticeship.

3. Apprentices who receive credit for previous experience or training will have an entering wage rate of the period to which this credit advances them.

E. Hours of Work

Apprentices shall work a forty (40) hour week, eight hours per day in the shop or on the job, for five days (Monday to Friday—inclusive), plus four hours per week in related class work, which is considered part of the work week for apprentices whether compensated or not. Such classes will be held Saturday mornings from 7:50 A. M. to 11:50 A. M. Major holidays shall be provided for.

At all times the apprentice shall be under the supervision of a journeyman.

F. Discipline

Problems of misconduct of apprentices shall be immediately reported to the "Toledo Committee" for disciplinary action. The "Toledo Committee" will record problems of misconduct and use them for measuring the fitness of the apprentice to become a member of the craft.

Learning on the Job and Related Instruction

This Plan divides the learning of manipulative skills and the learning of technical knowledge and information as follows: (See Exhibit 2).

1. That which is given by the employer in the shop or on the job under production conditions—as work experience.

Such shall consist of experience on the major operations, processes and machines or hand tools of the craft. The approximate amount of time the apprentice is expected to spend on each of the above shall be set down in the apprentice agreement.

This is the **work** side of the apprentice program, and shall be for 50 weeks in the year for 40 hours per week, as stated previously, or a total of 2,000 hours per year for four (4) years.

2. That which is given through a cooperative arrangement with the Toledo Board of Education and is called "related instruction."

Such instruction shall consist of regular class work to be given for 48 weeks in the year, 4 hours per week, for a total of at least 768 hours over the period of apprenticeship. When school conditions permit, the "Toledo Committee" may raise the number of hours of required instruction to more nearly meet the regular working year.

Apprentices shall be required to attend related instruction classes even when their shops may be temporarily shut down.

Classes in **related instruction** will be conducted in the Vocational High School on Saturday mornings, where suitable classrooms and facilities have been assigned.

Exhibit I

Apprentice Agreement

THIS AGREEMENT, entered into this.....
....day of .....193 ,
between .....
(Name of employer)
hereinafter referred to as the EMPLOYER
and .....
(Name of apprentice)
born .....
(and if a minor),.....
(Name of parent or guardian)
hereinafter referred to as APPRENTICE and
hereinafter referred to as
{PARENT.
{GUARDIAN.

Witnesseth that the EMPLOYER, the APPRENTICE and his PARENT (or GUARDIAN) are desirous of entering into an agreement of apprenticeship in conformity with the standards of the..... Committee on Apprentice Training; and therefore, in consideration of the premises and of the mutual covenants herein contained, they do hereby mutually covenant and agree as follows:

That the EMPLOYER agrees to employ the APPRENTICE for the purpose of enabling said APPRENTICE to learn and acquire the trade, craft or business of.....
....., upon the terms and conditions contained in the schedule marked "A" on the reverse side of this agreement and made a part hereof.

That the APPRENTICE agrees to perform diligently and faithfully the work of said trade, craft or business during the period of apprenticeship, complying with the training program contained in the said schedule.

That the PARENT (or GUARDIAN) covenants with the employer that the apprentice will duly perform all obligations undertaken herein.

That the apprenticeship term begins on the.....
day of .....193 ,
and terminates upon the completion by the apprentice of ..... (years or hours) of employment for said employer in said trade, craft or business, as stipulated in the said schedule.

That this agreement is subject to the approval of the State Committee on Apprentice Training; that after approval, annulment will be made by said Committee only

(*Continued on page* 23)

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At all times the apprentice shall be under the supervision of a journeyman.

F. Discipline

Problems of misconduct of apprentices shall be immediately reported to the "Toledo Committee" for disciplinary action. The "Toledo Committee" will record problems of misconduct and use them for measuring the fitness of the apprentice to become a member of the craft.

Learning on the Job and Related Instruction

This Plan divides the learning of manipulative skills and the learning of technical knowledge and information as follows: (See Exhibit 2).

1. That which is given by the employer in the shop or on the job under production conditions—as work experience.

Such shall consist of experience on the major operations, processes and machines or hand tools of the craft. The approximate amount of time the apprentice is expected to spend on each of the above shall be set down in the apprentice agreement.

This is the **work** side of the apprentice program, and shall be for 50 weeks in the year for 40 hours per week, as stated previously, or a total of 2,000 hours per year for four (4) years.

2. That which is given through a cooperative arrangement with the Toledo Board of Education and is called "related instruction."

Such instruction shall consist of regular class work to be given for 48 weeks in the year, 4 hours per week, for a total of at least 768 hours over the period of apprenticeship. When school conditions permit, the "Toledo Committee" may raise the number of hours of required instruction to more nearly meet the regular working year.

Apprentices shall be required to attend related instruction classes even when their shops may be temporarily shut down.

Classes in **related instruction** will be conducted in the Vocational High School on Saturday mornings, where suitable classrooms and facilities have been assigned.

Exhibit I

Apprentice Agreement

THIS AGREEMENT, entered into this.....
....day of .....193 ,
between .....
(Name of employer)
hereinafter referred to as the EMPLOYER
and .....
(Name of apprentice)
born .....
(and if a minor),.....
(Name of parent or guardian)
hereinafter referred to as APPRENTICE and
hereinafter referred to as
{PARENT.
{GUARDIAN.

Witnesseth that the EMPLOYER, the APPRENTICE and his PARENT (or GUARDIAN) are desirous of entering into an agreement of apprenticeship in conformity with the standards of the..... Committee on Apprentice Training; and therefore, in consideration of the premises and of the mutual covenants herein contained, they do hereby mutually covenant and agree as follows:

That the EMPLOYER agrees to employ the APPRENTICE for the purpose of enabling said APPRENTICE to learn and acquire the trade, craft or business of.....
....., upon the terms and conditions contained in the schedule marked "A" on the reverse side of this agreement and made a part hereof.

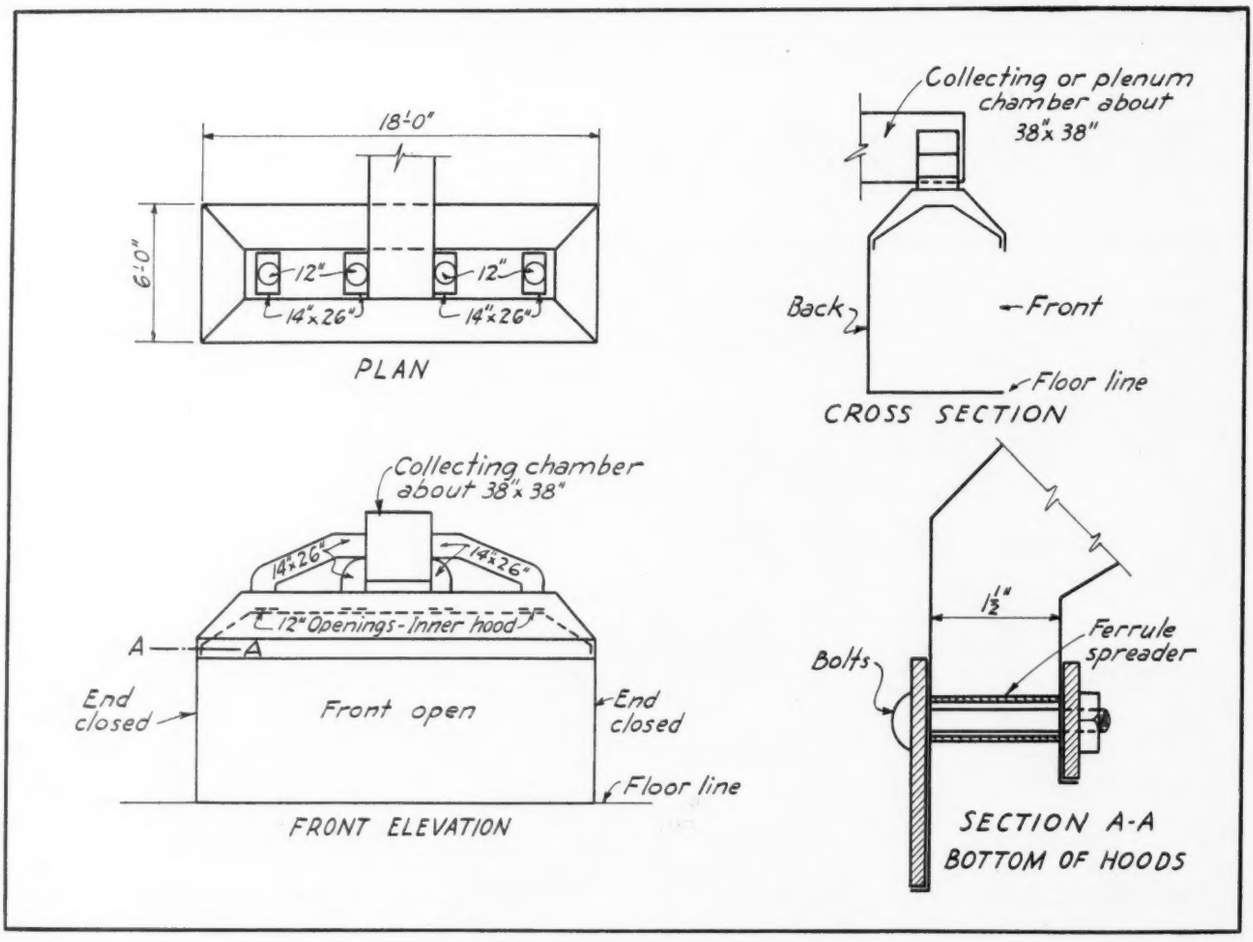
That the APPRENTICE agrees to perform diligently and faithfully the work of said trade, craft or business during the period of apprenticeship, complying with the training program contained in the said schedule.

That the PARENT (or GUARDIAN) covenants with the employer that the apprentice will duly perform all obligations undertaken herein.

That the apprenticeship term begins on the.....
day of .....193 ,
and terminates upon the completion by the apprentice of ..... (years or hours) of employment for said employer in said trade, craft or business, as stipulated in the said schedule.

That this agreement is subject to the approval of the State Committee on Apprentice Training; that after approval, annulment will be made by said Committee only

(*Continued on page 23*)



An Exhaust System for Smoke, Heat and Gases in a Brass Foundry

By R. F. Jeske
Milwaukee, Wisc.

TO efficiently exhaust smoke, heat and gases from the melting furnaces of a brass foundry is a real problem for the sheet metal contractor and many attempts have been failures. The writer offers explanations of an installation operating very satisfactorily. Employees in this foundry are not troubled with "Brass Chills."

This foundry operates four crucible furnaces (oil fired) of about 24 inch diameter inside of a brick shell. A very efficient exhaust method is to construct a "so called" double hood with slotted openings around all bottom edges and an opening in the inner hood only over each furnace, as was done in this case.

The drawing at the top of page shows the plan, elevation and cross section. The drawing also shows a full size section of construction at the bottom of the hood at the slotted opening between inner and outer hood. Dotted lines in the elevation indicate the outline of the inner hood. The dimension given apply in preference over scale. Note the method of attaching inner to outer hood. The slotted opening all around the bottom of hoods is 1½ inches wide and makes up a total of 6 square feet of area. The 12 inch diameter openings in inner hood and directly over the four furnaces have an area of 3.14 square feet. Then the slotted openings and the four 12 inch openings over the furnaces have a total area of 9.14 square feet. Holding a velocity through these openings of about 1,500 fpm we arrive at 13,700 cfm for blower or fan to exhaust.

Pipe velocities should also be about 1,500 fpm in

the four take offs or branches from the outer hood. Note that suction pipes connect to the outer hood only and in keeping with the velocity mentioned above, are about 14 inches by 26 inches, or the equivalent of 20½ inch diameter. The four branch take-offs lead into a collecting plenum chamber, which at 1,500 fpm velocity is about 38 inches by 38 inches in size, or the equivalent of 41 inch diameter. The discharge to outside atmosphere is not shown in drawings, as this will vary on every installation.

Equipment for exhausting to outside from plenum or collecting chamber can be either a multi-blade blower; or a propeller fan will answer the purpose if of a type to remove the 13,700 cfm against resistance of about .25 inch W. G. to .35 inch W. G. and at speed or rpm not objectionable within the plant and to surrounding homes if any.

Motor requirements will be from 1½ to 3 H. P. depending on amount of pipe and elbows at discharge end and motor must be kept out of air stream.

The hood has an apron extending down to the floor line at the back and both sides. The front only is left open. This creates a condition where all air enters the hood, passing over employees working at the furnaces and tends to keep heat, smoke and gases from the furnaces reaching or flowing towards employees.

Both inner and outer hoods should be constructed of No. 16 gauge and the piping of No. 20 gauge galvanized iron. At the top of the discharge pipe, if vertical, a double cone hood or bonnet should be used. If horizontal discharge, a turn down elbow is required. A damper for closing the discharge duct when system is not operating must be installed or an automatic back draft damper can be used and is preferable to a manual operating damper.

The method of double hood construction has a decided advantage over the single or open type of hood for a problem of this kind, due to the fact that a much smaller air volume is required with a double hood as compared to single hood type.

The Toledo Apprenticeship Plan

(*Continued from page* 21)

upon the mutual consent of all parties to the agreement or by the said Committee upon its own motion after notice to the parties and opportunity to be heard. During the probationary period set out in Schedule "A" such annulment may be made by the Committee without the formality of such notice or hearing.

That in the event of any disagreement or difference in relation to the agreement shall arise between the parties hereto, it shall be referred to the said State Committee for Arbitration and the decision of such Committee shall be final and conclusive upon the parties.

In witness whereof the parties hereunto set their hands and seals:

..... (Seal)
(Apprentice)
..... (Seal)
(Address)
..... (Seal)
(Parent or guardian)
..... (Seal)
(Employer)
.....
(An officer of the firm)
.....
(Address)

Approved by the State Committee on Apprentice Training by.....
on....., 193 ,

Schedule A

1. EXTENT OF THE PERIOD OF THE APPRENTICESHIP AND OF THE PROBATIONARY PERIOD
2. SCHEDULE OF PROCESSES TO BE LEARNED
3. OUTLINE OF APPROVED INSTRUCTION
4. COMPENSATION TO BE PAID
5. HOURS OF WORK AND HOURS OF APPROVED INSTRUCTION
6. SPECIAL PROVISIONS

The above form is prepared and distributed by the Federal Committee on Apprentice Training.

Exhibit II

Program of Instruction

Manipulative Skill or Shop Work learned on the job or in the shop.

Related Instruction — In Vocational High School Classrooms

First Year

Months		Materials and Methods of Construction 50
1. General Sheet Metal Work	6	Shop Mathematics 92
2. Operation of Hand and Machine Tools.	6	Sketching, Blue Print Reading & Layout Work 50
1st year total.....12 mos. or 2000 hrs.		1st year total 192

Second Year

1. Roofing and Spouting	4	Materials and Methods of Construction 50
2. Cornice and Skylights	2	Shop Mathematics 50
3. Heating and Ventilating	3	Blue Print Reading and Layout Work... 92
4. Furnace work	3	
2nd year total....12 mos. or 2000 hrs.		2nd year total.....192

Third Year

1. Heating and Ventilating	3	Materials and Methods of Construction 50
2. Exhaust and Blow Pipe work	6	Shop Mathematics ... 50
3. Welding common sheet metals	3	Layout Work 92
3rd year total....12 mos. or 2000 hrs.		3rd year total.....192

Fourth Year

		Hrs.
1. Air Conditioning ...	3	Shop Mathematics 50
2. Specialty Work	3	Layout Work 92
3. Erection in Sheet Metal Construction..	4	Shop Organization and Business Practices .. 50
Welding	2	
4th yr. total.....12 mos. or 2000 hrs.		4th year total.....192
Shop Work		Related Instruction
Grand Total .....48 mos. or 8000 hrs.		Grand Total, Hours 768

By J. Carl Wilson

Oxy-Acetylene
Welding
Stainless Steels

Welding Procedure for the Sheet Metal Shop

THIS series of articles would not be complete without one article devoted to oxy-acetylene welding. Owing to the fact that a good many shops have been using acetylene welding and most mechanics are familiar with the different phases of welding light gauge metal, we will deal with stainless steel in this article. We are finding today an ever increasing use and demand for more sanitary, rust and corrosion proof articles and the advent of stainless steels and bright metals presented a problem of fabrication new to all of us, but these problems have been overcome, thanks to the research department of our welding rod manufacturers. And today welding is in most cases the best method of fabricating these metals, either electric or acetylene. In this article only acetylene will be dealt with.

Many of these alloys on the market today bear special trade names or trade marks, but they may be dealt with according to certain groups depending on various characteristics which are a result of their composition. Among the alloying elements usually used, chromium is the most important and of the most value in imparting the properties of corrosion and oxidation resistance. A large percentage of the alloys also contain nickel. Recently it has been found that by adding small amounts of titanium or columbium the weldability of stainless steel has been improved.

The following data describes the welding procedure for the various groups of chromium alloys. Under proper conditions and with correct procedure these can be welded successfully in practically every case. Commercial stainless alloys are many but for this article we will form four groups most generally used in the sheet metal industry, with the recommended procedure for welding. And since these methods are governed largely by the amount of chromium in the alloys, this percentage is used to show under which head the particular type of alloy is placed. The procedure given for a certain group will be the same regardless of the difference in chemical composition which may occur within the limits of a group. It should be remembered that the compositions shown in respective tables are representative and nominal only.

Fluxes

Due to formation of infusable oxides, consisting mostly of chromium oxide together with smaller amounts of iron oxide and silica, flux must be used in welding these metals. The common fluxes for

welding and brazing are not suitable for this type of welding. For this type of welding a flux must be compounded so that it will readily dissolve the refractory chromium oxide and a sufficient viscosity at a high temperature to protect adequately from oxidation the molten metal and metal adjacent to the weld.

The author has tried many fluxes and found a large percentage of them unsatisfactory and unsuited for the job. It is not our intention to advertise any particular trade name or product in these articles and at this time the manufacturer is unknown to me, but a certain flux has been used for several years by the author and given highly satisfactory results*

Flame Adjustment

Flame adjustment is extremely important and best results will be obtained with the use of a neutral flame. An oxidizing flame will cause gas inclusions and tend to make a porous weld that will have very little strength and usually leak. A reducing flame tends to increase the carbon content of the weld and base metal adjacent to the weld, this reduces resistance to corrosion. This, however can be largely controlled with a flame adjustment which shows a slight perceptible acetlyene feather on the inner cone of the flame. A real reducing flame should be avoided as much as an oxidizing flame.

Group I—Stainless Iron and Steels

Chromium	11.5-15.00 per cent
Carbon, maximum	0.12 per cent

Irons of this class are used chiefly in sheet form, in gauges up to 16, edge type welds are in most cases the best type seam, the edges should be clean and free from scale, flanges should be about $\frac{3}{32}$ inch high, painted both top and bottom with flux mixed with water to make a paste. If a paste coated rod is used it is only necessary to paint the bottom of the seam. This protects the bottom from oxidation. On thickness $\frac{1}{16}$ and lighter the weld is made in the usual manner by fusing the edges together. The author has found it advantageous to use a tip one size larger than used for the same seam in ordinary cold or hot rolled iron. On heavier than 18 gauge, a welding rod of the same composition as the base metal should be used. If operator is not sure of the composition of the welding rod cut $\frac{1}{8}$-inch strips off the scrap base metal and use for the filler rod; this insures the right composition rod. On thickness of $\frac{1}{16}$ to $\frac{1}{8}$-inch, good butt-type welds can be made with proper jigs or holding devices. On gauges $\frac{5}{32}$-inch and thicker the edges should be beveled for best results.

Group II—Stainless Iron and Steels

Chromium	15-18 per cent
Silicon	0.50-1.50 per cent
Manganese	Max. 0.50 per cent
Carbon	Max. 0.15 per cent

In this group to obtain the best results use a filler rod of the 18-8 composition, it is not necessary to include the manganese or silicon in the rod, the same flux should be used as for Group 1. The base metal adjacent to the weld will show some grain growth, but with careful welding technique the grain growth can be kept to a minimum. After welding the ductility may be improved by annealing at 650 to 700 deg. Centrigrade.

Group III

Chromium	16-21 per cent
Nickel	6-12 per cent
Carbon	Max. 0.12 per cent
Manganese	Max. 0.60 per cent
Silicon	0.75 per cent

The group of steels commonly known as 18-8 containing 18% chromium and 8% nickel are welded without difficulty. The welds are strong and tough, but in severe conditions of corrosion the welds and the parent metal adjacent to the weld will not be as resistant to corrosion as the parent metal due to a precipitation of carbides brought about during the welding. When severe corrosion conditions are encountered by welded alloys containing over 0.07 per cent carbon, they may be returned to the corrosion resistant properties by heat treatment of 1000-1500 deg. Centrigrade followed by a water quench. The farther the carbon is reduced below 0.10 per cent, the greater the resistance to corrosion, and at 0.04 per cent the alloy in the as-welded condition is practically free from the intergranular corrosion.

In welding, the faster the travel and the shorter the period of time the metal is at 800-900 deg. C and the faster the cooling, the better the resistance to corrosion.

The oxy-acetylene process is in the author's opinion the best method of welding sheets $\frac{1}{16}$-inch or less in thickness; it may also be used for greater thickness, but the metallic arc process is more economical in heavy material owing to the high coefficient of expansion and the arc having more concentration of the heat, allows for faster welding and faster cooling thereby holding to a minimum the precipitation of carbides and grain growth.

Group IV—Nickel Chromium Alloy

Nickel	21.00-25.00 per cent
Chromium	7.00- 9.00 per cent
Carbon	0.30- 0.50 per cent
Copper	1.00- 1.50 per cent
Silicon	1.00- 1.50 per cent

Alloys of composition within the above ranges and others with varying amounts of nickel, chromium and silicon can be welded with satisfactory results. Owing to the high expansion properties, provision must be made for controlling expansion and contraction the same as with other alloys. With the higher nickel content the weld will be weak just after solidification, therefore care must be taken to insure freedom from locked up stresses during the cooling process. In all cases

(*Continued on page 27*)

*For name of flux write editors.

CLASS No	Full Time Weekly Hours	Hourly Rate	Full Time Weekly Wage	Ratio	Benefit Rate	Min. Hours To Avoid Partial		Name John Jones	Check No. 1
3	50	60	30.00	1-6	15.00	25		Occupation	Soc Sec. Acct.#

Week Ends	Week No.	Total Hours	Rate	Amount	Add. Earnings Amount	Total Earnings	Soc Sec Tax.	Other Deduct.	Amount Paid		Symbols ⓪	Weeks Unc	Emp. No		Remarks
Jan 2	1	50	60	30.00			.30		29.70		x	7	7		
9	2										x	8	8		
16	3										4	4	8		

Symbols :- ″ Probationary period.
x Weeks work
⓪ Weeks on which benefits were paid.

Fig. 1—Unemployment compensation record showing time worked, weekly hours, wage rate, deductions for insurance. Each employee has one of these card records.

Our Accounting Procedure for Unemployment Compensation

By Miss M. G. Prehn
C. F. Warning Company
Oshkosh, Wis.

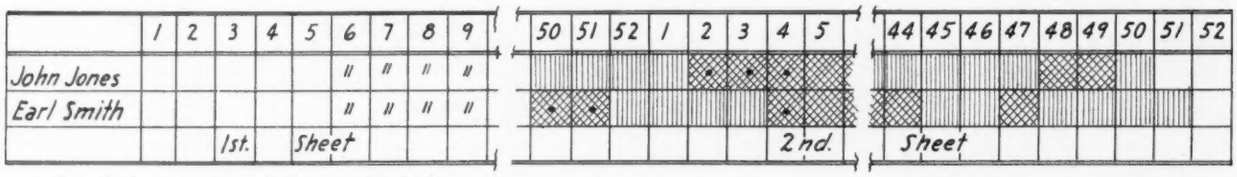
THE records from which we compile our Unemployment Compensation reports, include the regular payroll sheet which consists of the following columns: daily hours, total hours, rate per hour and earnings; a column for Social Security deductions and a column showing the net earnings for the individual employee.

At the end of each month we take a grand total of each week's labor for that month to which we add the office employees' salary amounts for the month, and compute our unemployment compensation tax from this total amount.

From this payroll record, the weekly total for Old Age Security is easily compiled. This total is entered in the ledger. To compute this tax to be paid the government by the corporation, the total labor earnings for the month is multiplied by the percentage of the tax and to this amount is added the individual deductions for the month which amount has been carried forward each month to a total figure for the month and the grand total to date for the year.

We have found that it simplifies the clerical work connected with reporting Unemployment Compensation, to keep a weekly labor record and also a sheet listing the employees, which is divided into 52 small squares representing the 52 weeks in the year as shown in Fig. 2.

Our unemployment compensation record carries an individual sheet for each laborer and shows the



Symbols :- ″ Probationery Period
• Waiting Period
Week Work
Week unemployment

Fig. 2—Yearly record of employment by weeks showing time worked, periods of unemployment, probationary period under Wisconsin law and time during which payments were made.

Name	S	M	T	W	T	F	S	Total Hours	Rate	Earnings	Soc. Sec Tax	Other Deduct.	Total Amt. Pd.	Check No.	Non Prod. Hours	Amount
John Jones	0	8	8	8	8	8	4	44	.60	26.40	27		26.13			
Earl Smith	0	8	4	8	4	4	4			etc						

Fig. 3—Employer's payroll record showing all employees with hours worked per day and week, wage rate, weekly earnings and insurance deduction.

total hours, the rate per hour and the total earnings. This individual sheet contains a column in which is shown the total weeks of benefit to which the individual is entitled should he be unemployed for a period of time. As soon as benefits have been paid this changes the last figure in "benefits due" to the exact amount of weeks still due the employee. In the upper left-hand corner the individual's weekly hours are shown as okayed by the Industrial Commission and also shown are his current rate per hour, his total earnings, his weekly benefit rate and the minimum hours he may work so that he will not be partially unemployed. From this record can be taken the total earnings at the close of the year for Income Tax returns. This record also gives the amount each employee has in his Social Security account.

The second record sheet which lists all the employees—on one sheet—with 52 weekly squares per employee, shows at a glance his employed weeks and his unemployed weeks. For every week the individual is employed, the square is colored green. A week of unemployment is indicated by coloring the square red. The three-week waiting period is designated by a black dot in the red square. Therefore, by going to this sheet, it is a simple matter to ascertain which men to lay off, which to re-hire and the exact number of working weeks to which each laid-off man is entitled to benefits. If an employee has a week of partial unemployment, it is so stated by marking one-half the square red. Should the employee be unavailable for work, a "u" is placed in the square, showing he did not work, but is not entitled to benefits.

We carry the Social Security amount in a special account in our ledger, the amount being taken from the weekly labor record. Each month we credit to this account the amount collected from our employees and our president and treasurer for Social Security tax. At the close of the month when computing our Social Security tax, under Title eight, we use this figure for listing on tax sheet under employees tax". We add the total labor amount for the month from our labor book and from this figure we compute the amount of tax our company must pay and in this easy manner the tax, under Title eight, is disposed of.

To keep the foregoing records up-to-date does not require more than two hours each week. For the readers' guidance we are showing herewith a few illustrations of our ledger sheets. The first, the individual employees' Unemployment Compensation and Social Security tax records; the second, the status of lay-offs and benefits of our employees as a whole for two years at a glance; the third, the regular payroll.

Welding Stainless Steels (*Continued from page 25*)

procedures as described under the welding of rustless iron, group 1, should be followed.

The higher silicon content of some of the commercial grades makes them weld better and lessens the tendency to air hardening. However, they are more subject to grain growth in the weld and the parent metal adjacent to the weld.

Excessive grain growth causes a brittle condition which can in most cases be restored nearly to its original composition by torch annealing at 650-700 deg. C. for about three or four minutes.

In order to secure good fusion the use of a good flux mixed with water to the consistency of a paste applied to the under side of the seam to prevent atmospheric oxidation and allow the bottom edge to fuse together.

If flux is not used on the under side, severe oxidation will take place leaving a fracture or groove at the bottom causing a very weak weld. If the end of the rod is dipped in the flux paste it will facilitate welding and prevent oxidation of the rod at the end. In making a weld only enough heat to secure a good fusion should be used. Over heating causes boiling and a porous weld is the result. The welds should be made as rapidly as possible and carried through to a finish without delay.

Bronze Welding

Rustless iron can be bronze-welded with very satisfactory results. It is necessary that the surface to be bronze welded be clean and free from oxides. A special flux made by mixing 75 per cent of a favorite flux with 25 per cent brazing flux has been used by the author with satisfactory results. When bronze welding is used, "after annealing" is not recommended or necessary as the temperature necessary to apply bronze welding is not high enough to have any noticeable effect on the composition of the parent metal. Where a color match makes no difference bronze welding has several points in its favor. It has good corrosion resistant properties and a strength of above 50,000 pounds per sq. in.

Stainless steels and iron can be satisfactorily welded by the axy-acetylene process if the above outlined procedure is followed. Full advantage should be taken of the fact that stainless steel products fabricated in this way have, as an added feature to corrosion resisting properties, the fact that they are welded. This in itself is an important factor, in adding strength, permanence and net appearance to manufactured articles. A welded, stainless steel product is a more salable product since it is better, stronger and more lasting.

In conclusion we may say the successful welding of stainless and high-chromium alloys depends chiefly on careful operation and a particular technique obtainable from any of the manufacturers of stainless alloys.

Better Weather Protection — Ridges

The recommendations presented in this series of illustrated reference sheets have been taken from various sources considered practical and authoritative. This article and the facing page of details covers several common applications of finishing ridges for roofs of metal, shingles, etc., as ordinarily applied.

IN the various articles published in this series, little has been said and no illustrations have been shown, of the methods of finishing off metal roofs at the ridge. That the ridge is important will be acknowledged by every sheet metal contractor, as experience has shown that the ridge is very frequently the location of roof leaks. Especially when the ridge roll has been improperly applied and loosens from wind pressure.

The collection of drawings on the facing page shows several types of ridge finishing using common forms of ridge roll. These illustrations have been selected from the manuals of the Copper and Brass Research Assn. (Sheet Copper) and the Zinc Workers Manual. While the methods shown are particularly recommended for copper and zinc, the same construction can be used for all other materials.

Flat and Standing Ridges Over Shingles

Fig. 1 shows a low ridge flashing without any projecting roll. The ridge boards are applied on top of the shingles and are nailed to wood blocks placed at intervals along the ridge. The shingles are cut out to fit around these blocks. A continuous block may be used for nailing. The ridge piece is secured to the boards by nailing or with brass screws at intervals along the edge. After the ridge is nailed down the projecting nose is turned down over the nail.

In Fig. 2 a specially shaped ridge board is required according to the size and shape of the ridge roll. This ridge board is nailed to the structural framing. The ridge roll is then placed in position and fastened with brass screws through brass clamps as shown. These clamps are used if the apron is more than 4 inches wide—if less, omit the clamps. Screws should be countersunk.

Fig. 3 shows a construction much like Fig. 2 except that the ridge roll is actually rolled at the top, providing a suitable location for nails or screws under the curve of the top. The lead washers make the screws watertight. This is an especially good construction for large ridges.

If it is necessary to omit the ridge board, standard ridge rolls can be installed as shown in Fig. 4. The roll is held in place by brass screws on lead washers in the apron. Holes must be drilled or punched through the shingles or slate beforehand. Still better practice calls for small metal caps soldered over the screws after the role is in place.

Where the roofing material is flat seam metal, the type of ridge shown in Figs. 5 or 6 are recommended. In Fig. 5 a flat sheet is folded over the ridge and cleated to the sheathing. The roofing is locked into the edge folds and either soldered or left loose as dictated by the slope of the roof. If movement must be provided for the construction in Fig. 6 should be used. This construction uses a large crimp into which the roofing sheets can slide. The edges of the sheet are folded back for stiffness. Note that the ridge roll is nailed in place along the apron before the roofing sheets are slipped into the fold.

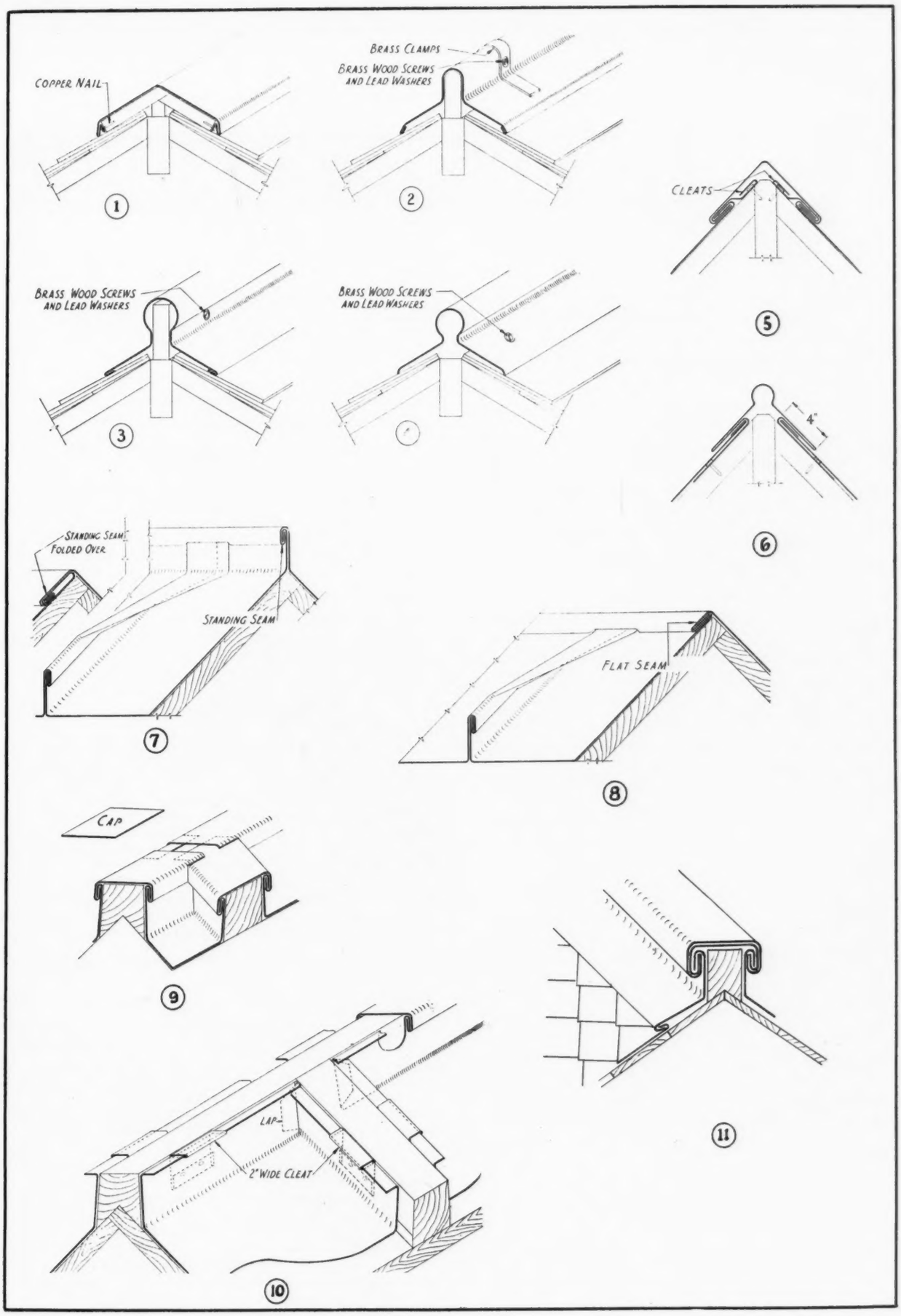
Ridges for Standing Seam Roofs

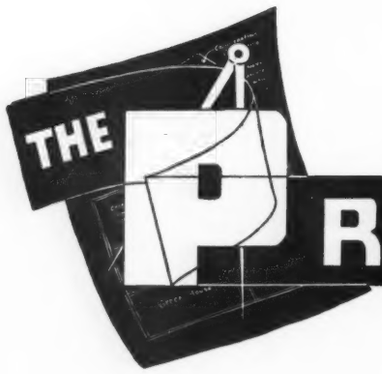
Figs. 7 and 8 show methods for finishing the ridge when the roof is standing seam metal. To construct, the pan sheets of the roof are cut long enough to stand up as shown in Fig. 7 with the sheets on one side at least ¼-inch longer than the pan sheets of the other side. If desired, the standing seam of Fig. 7 can be folded down flat as shown in the detail of Fig. 7. The standing seams of the roof are folded down as shown near the ridge and when completed these seams are folded into the ridge seam as shown. Usually the ridge seam is the same height as the roof seams.

If desired, the ridge can be made flat as shown in Fig. 8. Here the roofing seams are turned down flat in the same direction as the seams are formed and are folded in with the ridge seam. On one side the flattened roof seams run into the ridge seam; on the other side the roof seams are carried over the ridge and down into the ridge seam.

Figs. 9 and 10 show construction for a metal batten-type roof. The dimensions of the ridge batten

(*Continued on page* 34)


COPPER NAIL
1
BRASS CLAMPS
BRASS WOOD SCREWS AND LEAD WASHERS
2
CLEATS
5
BRASS WOOD SCREWS AND LEAD WASHERS
3
BRASS WOOD SCREWS AND LEAD WASHERS
4"
6
STANDING SEAM FOLDED OVER
STANDING SEAM
7
FLAT SEAM
8
CAP
9
LAP
2" WIDE CLEAT
10
11



Your comment or experience is invited.

PROBLEM CORNER

Mechanical Code Mathematics

American Artisan:

Will you please furnish information on some of the mathematics of the Mechanical Code?

Note 4 states:—Equation 6:—cfm = r.b.f. $\times \frac{926}{Td}$

What is 926?

Equation 8: "The factors in Table 3 are the numerical values of the fraction $\frac{150{,}679}{fpm \times Td}$ What is 150,679?

"The factors in Table 4 are obtained from the equation $A = \frac{132{,}010}{fpm \times Td \times r.b.f.}$ What is 132,010?"

Reply by
The Editors

The mathematics involved in equation 4 look like this—

$Btu = 1000 \times rbf$ ..... (4)

$Btu = cfm \times 60 \times 0.075 \times 0.24 \times Td$..... (5)

Then equating the second numbers of equations 4 and 5, we have

$1{,}000 \times rbf = cfm \times 60 \times 0.075 \times 0.24 \times Td$

Then transposing to find cfm, we have

$$cfm = \frac{1{,}000 \times rbf}{60 \times 0.075 \times 0.24 \times Td}$$

Then: $60 \times 0.075 \times 0.24 \times Td = 1.08 \times Td$

So we have

$$cfm = \frac{1{,}000 \times rbf}{1.08 \times Td}$$

Then dividing 1,000 by 1.08 = 925.9 or 926

So we have

$$cfm = \frac{926 \times rbf}{Td}$$

or,

$$cfm = rbf \times \frac{926}{Td}$$

Substituting in equation (7) the value of cfm shown in equation (6) and simplifying, looks like this

Equation 7 is: $A = 144 \times \frac{cfm}{fpm} \times 1.13$

Equation 6 is: $cfm = rbf \times \frac{926}{Td}$

Substituting equation 6 for cfm in equation 7, we have

$$A = 144 \times \frac{rbf \times \frac{926}{Td}}{fpm} \times 1.13$$

Simplifying to put all numbers in the numerator, we have

$$A = \frac{144 \times 926 \times 1.13}{fpm \times Td} \times rbf$$ ..... (X)

$$A = \frac{150{,}678.7}{fpm \times Td} \times rbf$$ ..... (8)

Equation (9) is for return air rather than for warm air as is equation (8). In working equation (8) we got

$$A = \frac{150{,}679}{fpm \times Td} \times rbf$$

the 150,679 being 926 times 144 from equation (6) $\times$ 1.13.

The 1.13 is the ratio of volume of warm air at 140 degrees to room air at 70 degrees.

But for equation (9) we deal with cool air at 65 degrees rather than 140 degrees, so we have in (X) above

$$\frac{144 \times 926 \times .9905}{fpm \times Td} \times rbf$$

$144 \times 926 \times .9905 = 132{,}076$.

The code committee used .9824, but we prefer .9905 and refer you to Furblo Bulletin No. 5, sheet 4.

◆

Return Air Resistances

American Artisan:

I have followed all of Mr. Voorhees' articles which are indeed very fine contributions to forced air heating practice. In new forced air systems what practices should be followed to match such design as outlined by Mr. Voorhees on remodeled jobs? What resistance should be figured for the return air side of the system? What resistance can be added to the intake side of the blower? Is it better practice to increase the size of return air pipes, thus lowering the resistance and eliminate the friction caused by high velocities, or can the return air system be figured as closely as the supply side depending upon the increase in volume due to increasing the air temperatures to somewhat lessen the return system friction?

J. G. H., Nebraska.

Reply by
The Editors

In answer to your letter regarding return air systems, the general practice is to design the return air system to a resistance equal to or slightly less than the resistance of the supply side. If the resistance of the supply side (furnace casing, blower boot, leader pipes, stacks and registers) is .20 inches of water, the resistance of the filters, return air ducts and return air grilles should be .20 or a little less.

If you will refer to the January, 1936, article by S. Konzo, you will find a tabulation of typical resistances which you can follow with confidence.

We believe also that you will find a considerable amount of information on return air systems in the article by G. A. Voorhees in the May and August, 1936, issues of American Artisan.

If you have a set of Furblo Institute Bulletins, you will find a very complete discussion of return air systems therein. If you do not have a set of these bulletins, write Platte Overton, Chief Engineer, Furblo Company, Hermansville, Michigan, and ask for a set.

Today's Revolution in Business

By Joseph G. Dingle
C. P. A., Ottawa, Ill.

DO YOU realize that we are today witnessing a revolution; a bloodless one thus far; but, nevertheless, a revolution? Many there are who refuse to see what is happening; and there are those who, seeing, fail to believe what they see. The live, wide-awake, business man, be he large or small, is seeing, believing, and trying to understand just what is happening; what it means to all of us, and particularly what its effect will be on him, his family, his business. We do not profess to know all the answers, nor can we point out all the problems arising, or likely to arise, which must be seen, understood and mastered by the American Business Man. We shall, however, attempt to point out and discuss some of the present trends, hoping that by so doing we shall help one or more business men to realize the conditions facing us and thus be better able to contribute his part of the manpower required to keep America on an even keel and to master the storm of Changing Conditions now raging around us.

We shall not attempt a political discussion. There is a great deal to be said about the part of politics in business; about government in business; of the alleged failure of our American industry to meet its full responsibility towards the masses. The author would like to dispose of these matters by the simple statement that if by changing the wilderness, infested with savages, into the world's greatest industrial nation in one hundred fifty years, we have failed to do the right thing by the masses who constitute America today, we should have more of that kind of failure.

Some Depression Changes

The depression has brought about many changes. Big business men are now little fellows in the business world; little fellows are smaller than they used to be; and there are many who have suffered greatly in their ideas and ideals. In many lines there are itinerant merchants, doing business from trucks, automobiles, and even from the curbstone. While it is true one must carry on as best one can, there is the big question facing the merchant, shop owner, and the wholesaler and manufacturer. What is the wholesaler, the jobber, and the manufacturer to do about the itinerant? Are they going to recognize him as a legitimate outlet for their goods and sell him at the same prices afforded the stationary merchant and shop owner? If so, what can the dealer who still operates his store or shop do to protect himself? He has many expenses which the itinerant merchant does not have and while he may, by reason of being stationary, do a bigger business than the itinerant, will it be possible for him to do such an amount as will enable him to compete with the itinerant and still maintain a profit?

We wish to discuss this problem of changing conditions facing the business men of today, particularly as it relates to the small business man. He is the man who needs help, needs counsel, needs advice and warning. His success or failure is tied up with that of the larger business men and the two cannot be separated without a very serious operation, usually resulting in great financial loss to both the small and the large. We can but speak generally, and hope to cause the individual reader to start thinking seriously on his own part of this problem.

What do you suggest we do about the itinerant contractor? Or the curbstone manufacturer? Can you protect yourself against the "fast talker" who wants to sell you a fancy display room and over extend your credit? Remember, profit is not built on single sales for large commissions, but on many sales for legitimate profits.

+

Longfellow immortalized the village blacksmith, and, we might add, that poem helped place Longfellow among the immortals. The village blacksmith as we once knew him is practically extinct. Some have survived as the garage man, but others have just ceased to exist. One of the first things the embryo garage man had to do was to throw away his monkey wrench and get a set of socket wrenches. The old square nut of the carriage was replaced by the hexagon nut of the automobile. Speaking of square and hexagon nuts reminds us of a certain carriage repair shop which, in its day, had been rather a successful business, and as the automobile replaced the carriage, the old fellow who had for many years been replacing lost bolts in carriages for 25 cents reported with great glee the fact that the automobile owner would pay $1.00 to have a bolt replaced. Of course, the automobile bolt cost more than the carriage bolt, and the work was of an entirely different character. Yet, this old fellow frequently made minor repairs on automo-

biles and reported no sale, stating that it had not cost anything; that he had done the work himself. Still "horse and buggy" in his thinking.

Let's take a look at the tin shop of the "blacksmith age." It's gone too. Machinery now makes in quantity many of the products formerly turned out by the tinner, and the development of ventilating, air conditioning, etc., has presented problems as great as did the automobile for the village blacksmith. The tinner of yesterday may have become the ventilating and heating man of today, or he may pass on down the route of the village blacksmith. If the tinner takes to the new tools of the craft; if he studies the changes and prepares to meet them; he will be found in the front ranks of the Heating and Ventilating Engineers; but if he keeps those tin snips in his hand too long, he, too, will disappear.

White Shirts for Work Shirts

Preparation is the big thing today. The present day home, where the big field of heating and ventilating lies for the small operator, is a mechanized place. Automatic refrigeration, automatic heating and automatic appliances of all kinds and uses are to be found in nearly every home, and those that do not yet have them are only awaiting the time, or the money, when they may be had. These appliances are usually manufactured complete and ready for installation in the home by national concerns maintaining national sales organizations, with some local representation. Therein lies the danger for the little fellow who does not think things out fully and act only after careful investigation. It is a nice thing to keep abreast of the times, to have a modern shop, or, to use the present day term—show room. It is one thing to actually design and make up the parts, then install them on the job and have them work properly; still another thing to sell and install a new and much more complicated, yes, and more complete, device or appliance to accomplish the same and additional results.

It is our belief that with the changing conditions, the business man on the job who has for years taken care of the community's wants in a certain line, and who has earned the confidence and respect of his fellow citizens through long years of work well done, is the man who should take on the new appliances in his field, provided he is or will become qualified to render the same high class service as he did render in his old field. It is our belief that the national manufacturer of appliances and devices should recognize this source of outlet for his product and should see to it that suitable training is provided to enable these local men to properly sell, install, and service the newer devices and appliances. It is our belief that this training should be more than mere high pressure salesmanship to get the small local business man to give up his old shop, take a new and more expensive location on the main street, install new and modern fixtures, including a desk for himself, all at his own expense, for the purpose of showing to the best advantage these new products of the manufacturer. It takes a great deal more than a main street location, a desk for the proprietor, and the substitution of a white shirt for the old work shirt, to convert the small business man into a successful seller of modern appliances.

Customers Don't Know Seller

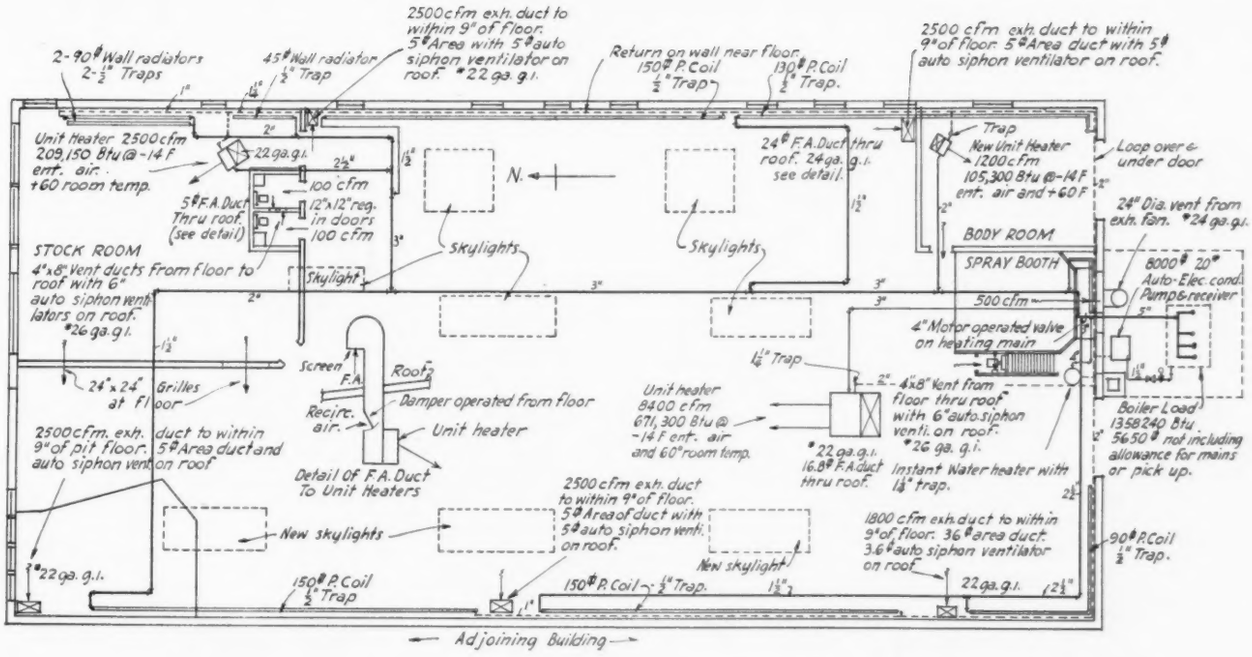
The sales approach is quite different. Under the older scheme, the customer came to the shop, asking that something be done to the old equipment. Both the customer and the merchant were dealing with a product well known to both. They had had previous business experience with each other on this sort of work and understood it. The newer program is either to replace the old equipment with the new and modern; or to install the new in places where there is none of that service at present. The customer may, or may not, be familiar with the results to be expected, the benefits to be derived, the economies to be realized, or the petty annoyances which come from all mechanical devices at times.

Then, again, there is the matter of competition. Some young fellow may have come into the field with specialized training, and high sales ability, and unless the older merchant is prepared to meet that kind of competition, either in kind, or by his long established reputation for fair and square dealing with his customers, there will come a time when failure will be staring him in the face; his capital will have been dissipated through maintaining an expensive overhead with little or no sales.

Don't Be Stampeded

Our message to the small business man is this: Keep up with the times, by studying the changing conditions, the newer merchandise in your line, the methods of merchandising, and be slow to adopt new and untried policies which you have not carefully thought out to the final end. Do not let some manufacturer come along and talk you into setting up a beautiful show room for his merchandise unless and until you feel you are able to meet the responsibilties of the new venture. And above all, do not over-extend your credit for such a purpose. You may be only the means of first introducing a new product to your community, without benefit to yourself, and after you have gone down in defeat, some other fellow may take up the line and, aided by your introduction, carry it on to success. The product may be all the manufacturer claims it to be but the big question is ARE YOU PREPARED TO HANDLE IT. You should build the proper foundation before erecting your new house thereon; you should carefully and seriously weigh the good points and the bad points of the change; you should consider your training for the task, your sales experience and ability; and also ascertain what part, if any, of your prior business experience will be of material benefit to you in the newer venture.

(*Continued on page* 90)


2-90# Wall radiators 2-1½" Traps
45# Wall radiator ½" Trap
2500 cfm exh. duct to within 9" of floor. 5# Area with 5# auto siphon ventilator on roof. #22 ga. g.i.
Return on wall near floor. 150# P.Coil ½" Trap
130# P.Coil ½" Trap.
2500 cfm exh. duct to within 9" of floor. 5# Area duct with 5# auto siphon ventilator on roof.
Unit Heater 2500 cfm 209,150 Btu @ -14 F ent. air. +60 room temp.
22 ga. g.i.
100 cfm
12"x12" reg. in doors
100 cfm
5# F.A. Duct Thru roof. (see detail)
STOCK ROOM
4"x8" Vent ducts from Floor to roof with 6" auto siphon ventilators on roof. #26 ga. g.i.
Skylight
Skylights
N.
24# F.A. Duct thru roof. 24 ga. g.i. see detail.
Trap
New Unit Heater 1200 cfm 105,300 Btu @ -14 F ent. air and +60 F
Loop over & under door
24" Dia. vent from exh. fan. #24 ga. g.i.
BODY ROOM
SPRAY BOOTH
8000# 20" Auto-Elec. cond. Pump & receiver
500 cfm
4" Motor operated valve on heating main
1¼" Trap
24"x24" Grilles at floor
Screen
F.A.
Recirc. air.
Roof
Damper operated from floor
Unit heater
Detail Of F.A. Duct To Unit Heaters
Unit heater 8400 cfm 671,300 Btu @ -14 F ent. air and 60° room temp.
2-4"x8" Vent from floor thru roof with 6" auto siphon venti. on roof. #26 ga. g.i.
#22 ga. g.i. 16.8# F.A. duct thru roof.
Instant Water heater with 1¼" trap.
Boiler Load 1358240 Btu 5650# not including allowance for mains or pick up.
2500 cfm. exh. duct to within 9" of pit floor. 5# Area duct and auto siphon vent on roof
New skylights
2500 cfm exh. duct to within 9" of floor. 5# Area of duct with 5# auto siphon venti. on roof.
1800 cfm exh. duct to within 9" of floor. 36# area duct. 3.6# auto siphon ventilator on roof.
New skylight
90# P.Coil ½" Trap.
#22 ga. g.i.
150# P.Coil ½" Trap
150# P.Coil ½" Trap.
22 ga. g.i.
Adjoining Building

The plan shows the arrangement of the garage facilities; the unit heaters, skylights, exhaust vents, and details of application. Air and heat handled are itemized.

Ventilating A Garage To Wisconsin Specifications

IN the revised edition (April 11, 1936) of the Heating, Ventilation and Air Conditioning Code for Wisconsin, section 5852 states—"Garages. This classification shall be understood to include all repair and also all storage garages housing 6 or more vehicles driven by internal combustion engines, except that a building housing vehicles which do not contain volatile inflammable liquid need not be included in this classification.

"Ventilation. Ventilation shall be provided and maintained for all occupied areas in this class.

"Live Storage Areas. All areas providing live storage for such motor driven vehicles shall be provided with not less than ¾ cubic feet of air per minute of outside air supply per square foot of floor area.

"Repair Areas. All areas in which repairing of motor driven vehicles is customarily done shall be supplied with not less than 1½ cubic feet of outside air per square foot of floor area. All such areas shall also be provided with sufficient flexible hose connections to provide for the full capacity of the vehicles in the repair area. Hoses shall be provided with suitable devices for connecting to exhaust pipes, shall be provided with shut-off valves which may be closed when not in use, and shall be conducted to approved pipe stacks which shall extend to the outside air.

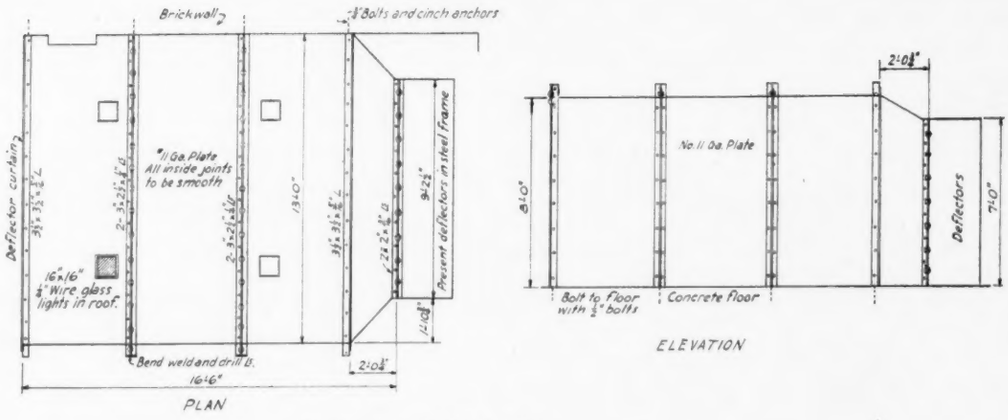
"Note: In addition to these requirements it is recommended that all repair areas be provided with exhaust fans for flushing purposes having a minimum capacity of 5,000 cfm. for the first 2 car capacity in repair areas, plus 1,000 cfm. for each additional car capacity.

"No basement or sub-basement garage shall be used for repairing of any kind nor for the storage of volatile inflammable liquids, except as provided in orders 816 and 818."

The specifications cited above were incorporated in the design of a heating and ventilating system for the garage of the Wolter Motor Company of Appleton, Wisconsin by Orbison and Orbison, Engineers and constructed by the sheet metal department of the Schlafer Hardware Co., of Appleton.

The general arrangement of the garage is shown in the drawing. The stock room and greasing pit is at the front, the storage and repair department occupies the central area, the body room, spray booth and wash rack are placed across the rear.

Heat is supplied by a boiler housed in an attached room at the rear. The 1,358,240 Btu. output of the



Details of the spray booth showing heavy sheet on angle iron construction and dimensions.

DETAILS OF SPRAY BOOTH

boiler is distributed throughout the building through just over 800 square feet of pipe coil laid against outside walls as shown and through three unit heaters with a total capacity of 985,750 Btu. at —14 degrees entrance temperature to 60 degrees room temperature.

The three unit heaters have a combined air delivery of 12,100 cfm. for a floor area of 10,350 square feet, or just over one cubic foot of air supply for each square foot of floor area. As shown on the plan, there are five exhaust ducts capped with automatic siphon ventilators having a rated combined capacity of 11,800 cfm. As shown these exhaust ducts are brought down from the ventilators above the roof to within 9 inches of the floor.

With this design, each unit heater is directly connected by a closed duct to the outside air so that all the 12,100 cfm. of heated air distributed within the garage is brought in from the outside and raised to room temperature while almost as much air is withdrawn by the ventilator capped exhaust ducts. Thus all air within the garage is changed practically every minute.

The indicated difference in air introduced and air withdrawn is further made up by several small vent ducts in the stock room and wash room and through some exhaust action which will probably occur through the seven skylights which were a part of the Schlafer contract.

The spray booth, under Wisconsin law, requires special provision for ventilation. As shown, the booth is 13 by 16 feet by 8 feet high and has an individual fan exhauster with a capacity of 5,000 cfm. The exhaust is through a duct with a top vent cap above the roof. The booth is constructed of number 11 gauge plate within an angle iron frame as shown in the detail. The exhaust duct is brought in through the rear building wall and connected to the back of the booth.

All metal work was fabricated in the Schlafer shop, a few blocks distant from the garage and brought to the job in lengths suitable for erection.

Better Weather Protection—Ridges (*Continued from page* 28)

seam is governed by the slope of the roof so that the roof battens meet it with flush tops. Roofing sheets should be cut so that they can be turned up in the corners against both battens and have ½-inch flanges left to receive the cap sheet. The tab marked "lap" in Fig. 10, which is a part of the side of the pan sheet, is folded back of the sheet and soldered watertight before the sheet is laid. After the pans have been cleated in place, the batten caps are slid on and locked. As shown in Fig. 9, these caps are cut at the corners so they have tabs at the ends corresponding to the 1 inch turned down at the sides. The roof batten caps are placed first and their tabs partially covered by those in the ridge batten caps. The separate ridge cap piece is then soldered in place to cover the gap between the batten caps. At the same time the vertical seams at the batten locks in the corners are also soldered.

As an alternative, the corners of the pans may be folded at the intersections of the ridge and hip with the roof battens to eliminate soldering, but this construction often results in a sloppy job. The ridge batten can be omitted, by running the roof battens up from opposite sides until they meet. The bottoms of the pans and the tops of the batten caps are joined with flat locked seams filled with white lead. The sides of the pans are lapped and soldered along the line where they intersect.

Ridges Over Metal Tile

Fig. 11 shows a method recommended for metal tile. Ordinarily such tile cannot be bent up against the ridge batten as this would open interconnecting locks. The top edges of the top row of tile are turned over as shown to form part of a lock and are fastened at intervals with cleats. A strip of metal is then folded into this top turn of the tile and is cut wide enough to extend up the side of the ridge batten with some additional width to lock into the ridge cap. This apron strip is fastened at intervals along the top of the ridge with cleats.

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RESIDENTIAL AIR CONDITIONING SECTION

IN this issue we complete publication of the new Technical Code for the Design and Installation of Mechanical Warm Air Heating Systems recently released by the National Warm Air Heating and Air Conditioning Assn.

- - - This code warrants consideration because it presents a complete and detailed design procedure to cover all but the very largest houses. In our estimation the provisions for getting the required number of air changes regardless of house insulation; the means for compensating for temperature drop in ducts; calculating actual register air temperature; and designing all ducts so that a minimum of dampering is needed make the new code worth using.

- - - The tables and charts for speeding up design procedure are also worthy of study.

- - - We suggest that every contractor purchase a copy of this code. The price is 50 cents from the association, address 50 West Broad St., Columbus, Ohio, or from this publication.

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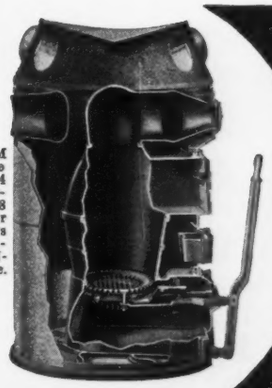

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You can make Sunbeam sales now; you will receive all your money when the installation is completed, but your customers need not make their first payment until September 30th! There is no increase in financing rates for deferring payments during the spring and summer months—no reason why the buyer should postpone action.

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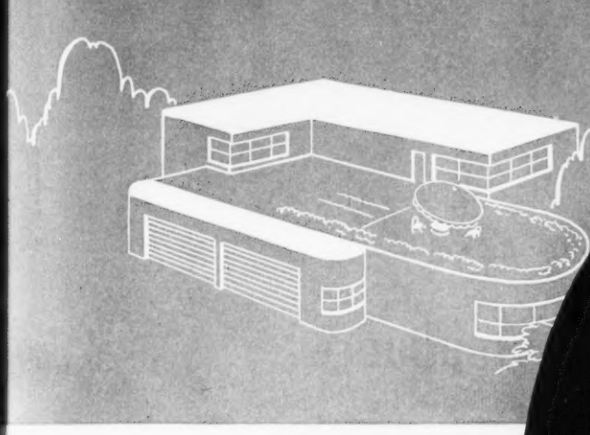

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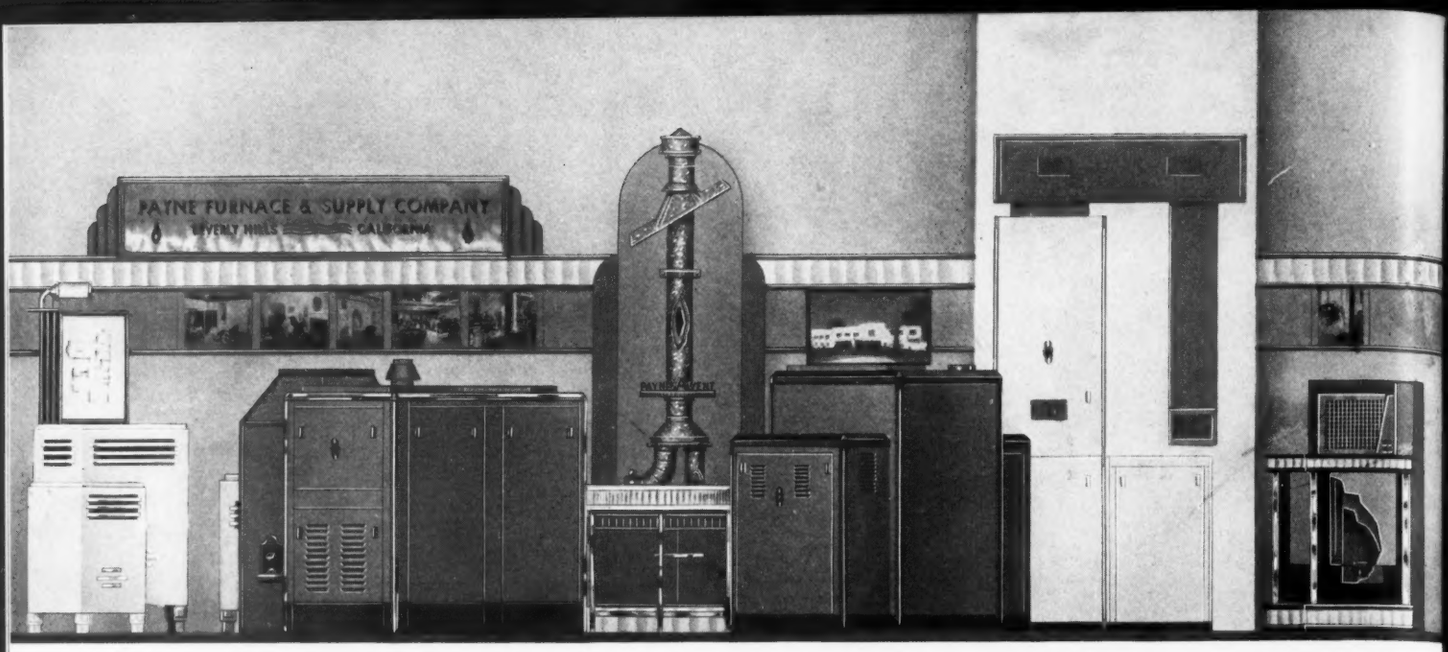

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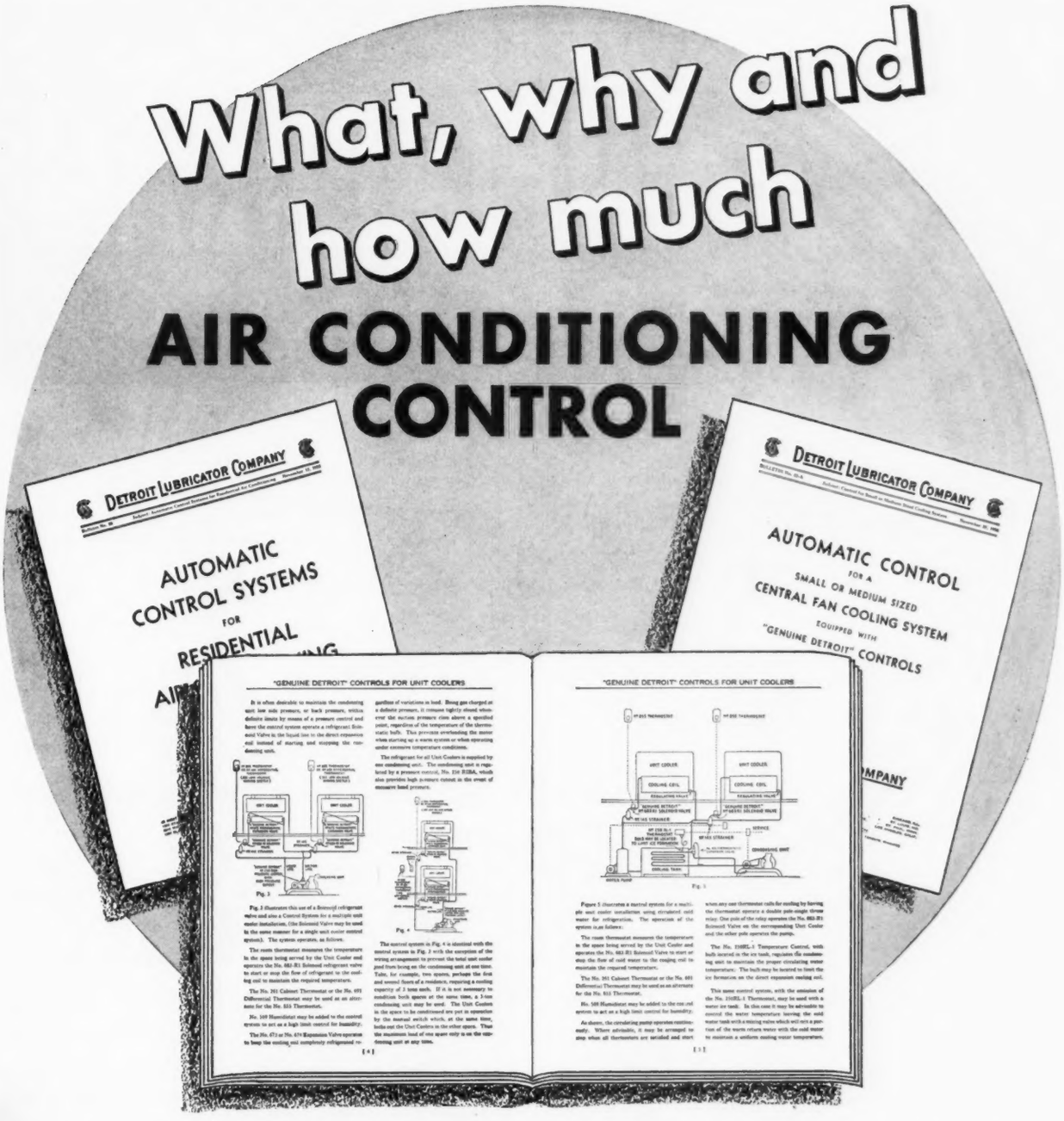
What, why and how much AIR CONDITIONING CONTROL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"GENUINE DETROIT" CONTROLS FOR UNIT COOLERS
"GENUINE DETROIT" CONTROLS FOR UNIT COOLERS

Here are three new guides to help you in the planning and selection of control equipment for Heating, Cooling, Humidification and Dehumidification. These bulletins have been written to show clearly the functions and operation of control equipment for all of the customary types of domestic and commercial air conditioning systems—not to sell any one type of system or control.

They deal with the principles involved and the results to be accomplished. They show how to plan a given job economically and to avoid subsequent trouble and servicing. They are offered primarily for the purpose of promoting air conditioning at large.

The coupon will bring your copies to you promptly until the supply is exhausted.

DETROIT LUBRICATOR COMPANY
5900 TRUMBULL AVENUE • DETROIT, MICHIGAN

NEW YORK, N.Y.—40 West 40th St. • CHICAGO, ILL.—816 South Michigan Ave.

Canadian Representative—Railway and Engineering Specialties Ltd., Montreal, Toronto, Winnipeg

DETROIT LUBRICATOR COMPANY Dept. H
5900 TRUMBULL AVENUE, DETROIT, MICHIGAN

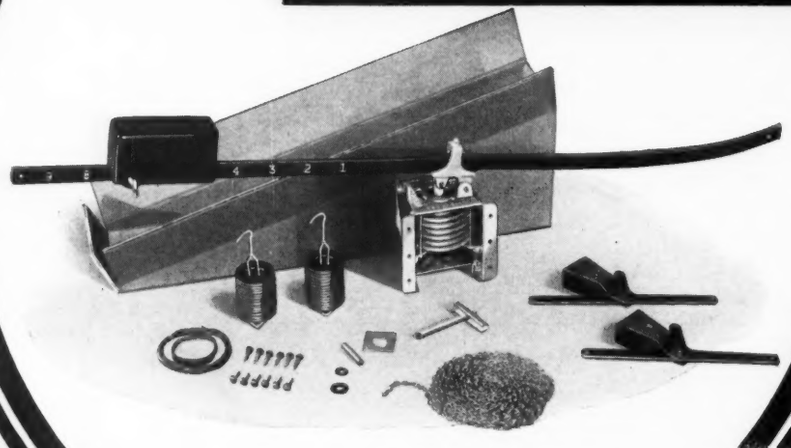
Please forward Bulletins 83, 84 and 90, dealing with air conditioning control.

NAME_____

COMPANY_____

ADDRESS_____ POSITION_____

THE METAPHRAM REGULATOR



FURNACE TEMPERATURE CONTROL AT *Low Cost*

THE Metaphram furnace regulator will fill your demand for a low price control. Actuated by the return air temperature, the Metaphram Regulator safeguards the furnace against excessive temperatures and prevents under-shooting. It eliminates much attention on the part of the owner and results in a considerably more even temperature throughout the building than when manual control is employed. When price is the main objective, recommend Metaphram Furnace Regulators. They are simple, fool-proof, and durable. Minneapolis-Honeywell Regulator Co., 2726 Fourth Ave. So., Minneapolis, Minn. Branch and distributing offices in all principal cities.

MANUFACTURED BY

AUTOMATIC CONTROLS MH

NATIONAL REGULATOR DIVISION

MINNEAPOLIS-HONEYWELL

BROWN INDUSTRIAL INSTRUMENTS
NATIONAL PNEUMATIC CONTROLS

Control Systems

MAKE MONEY

WITH *NORGE* HEATING AND AIR CONDITIONING EQUIPMENT

Investigate the Norge franchise now. *You'll find Norge equipment sells itself because it's years ahead in operating efficiency. And it's backed by a powerful Norge sales promotion and advertising program. Liberal finance plans make it easy to be a Norge dealer. Write or wire for details.*

NORGE HEATING AND CONDITIONING DIVISION *Borg-Warner Corporation, Detroit, Michigan*

THE NORGE GAS BURNER

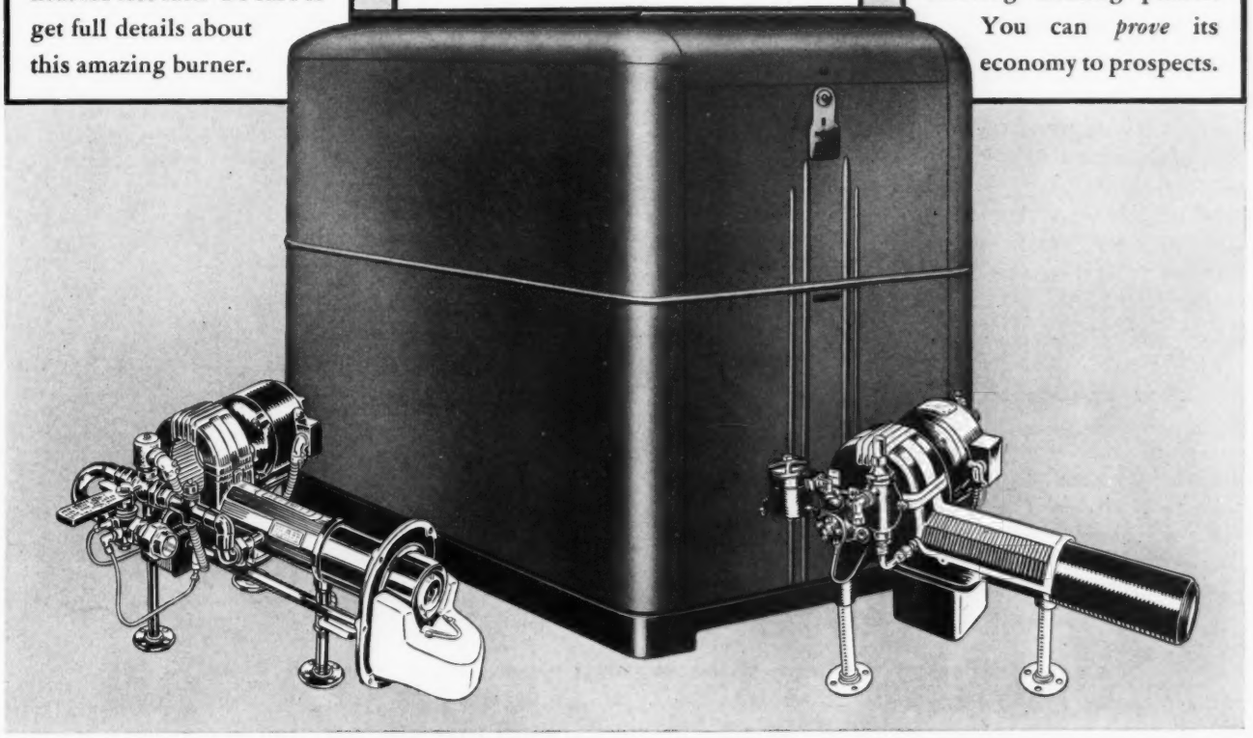
Cuts gas heating costs as much as 50%. A "pressure" type burner with triple-control of gas and air—gives economy never before possible with gas—more heat for less fuel. Be sure to get full details about this amazing burner.

NORGE FINE-AIR CONDITIONING FURNACE

Exclusive design of heat transfer unit makes possible savings of up to 50% for the average home now using old-fashioned equipment. Warms, filters, humidifies, circulates correct volume of air for every room in the house. Can be adapted easily to full summer air conditioning with genuine Norge *Rollator* cooling unit.

WHIRLATOR OIL BURNER

The Norge Oil Burner operates on the exclusive Whirlator principle—clean, quiet, economical. For use in the Norge Fine-Air Furnace or in modernizing existing heating plants. You can *prove* its economy to prospects.



See the sensational New Rollator Refrigerators and Norge Concentrator Ranges today.

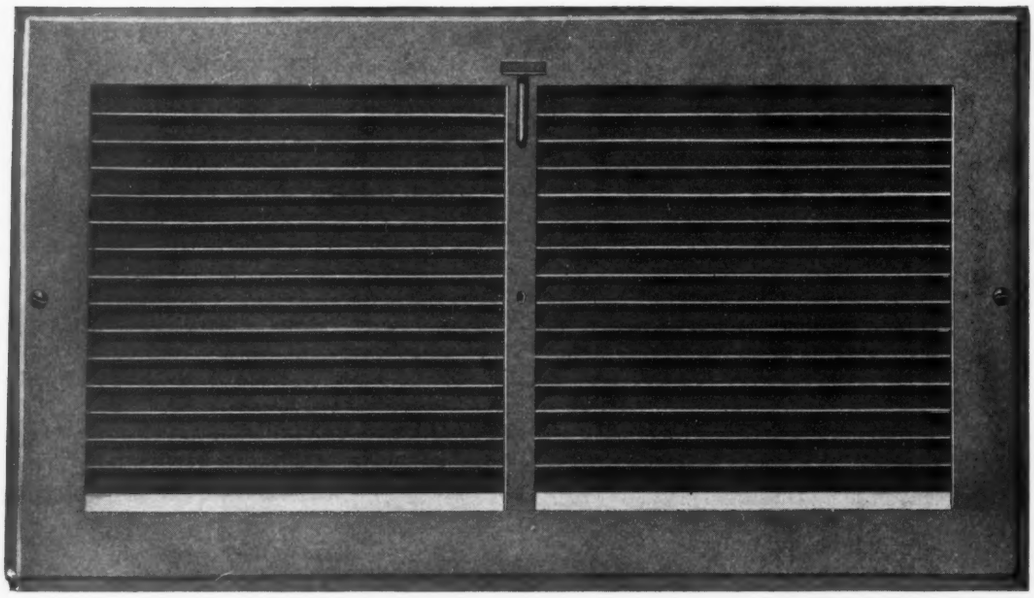
NORGE

Plus Value HOME APPLIANCES

Norge Autobuilt Washers and Duotrol Ironers are the 1937 performance and style leaders.

HC-7

US creates A SENSATION in AIR CONDITIONING ADUSTABLE—BAR DIRECTIONAL —FLOW REGISTERS



Style 145, by a lever-pin that is removable after adjusting, is adjustable to an upward or downward flow of 60°.

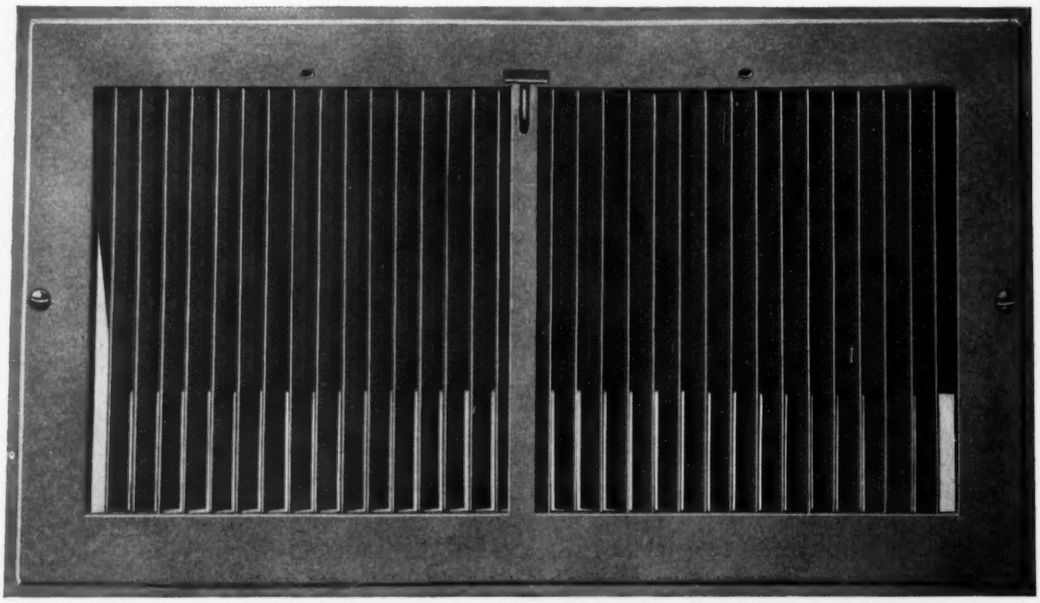
A NECESSITY FOR AIR-COOLING.

Furnished with side-wall, stack head frames, SEAL-PAK frames, and BASE-BOARD frames.

Are interchangeable with ALL STYLES of U. S. AIR CONDITIONING REGISTER FRAMES.

A NEW DISCOVERY in AIR-CONDITIONING REGISTER CONSTRUCTION that offers THE ONE and ONLY REGISTER through which the DIRECTION of AIR-FLOW MAY BE CHANGED UPWARD, DOWNWARD, RIGHT, LEFT and MULTI-FLOW without use of a wrench or tool to cut and ruin finished register surface. In the Horizontal Bar Designs the adjusting slot is in the vertical mullion. Vertical Bar Designs have adjusting slot over top of each group or section of bars.

Style 149 (at right)—Vertical bar with right, left, straight or multi-flow adjustment.



Complete lines of adjustable bar and our other lines of air conditioning registers will be shown in OUR NEW GENERAL CATALOG No. 27.

Write your jobber or direct to us or our nearest branch office for this complete catalog covering our complete lines of GRAVITY BASEBOARD — FLOOR REGISTERS — FACES — AIR CONDITIONING REGISTERS — GRILLES and GRAVITY and AIR CONDITIONING FITTINGS.

UNITED STATES REGISTER CO.

Builders of the LATEST and FINEST TYPES of GRAVITY and AIR-CONDITIONING REGISTERS

GENERAL OFFICES AND FACTORIES: BATTLE CREEK, MICHIGAN, U. S. A.

Branch Offices and Factories

MINNEAPOLIS, MINN. KANSAS CITY, MO. ALBANY, N. Y.

ASK YOUR JOBBER

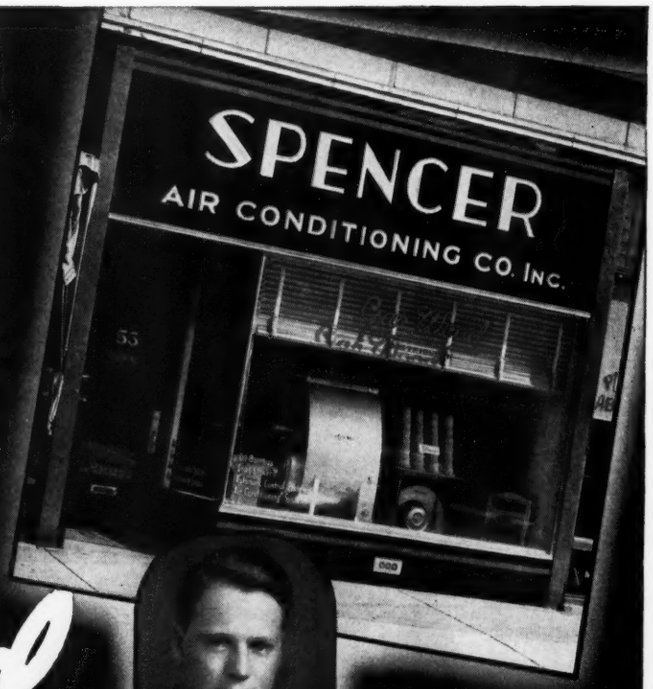
Rugged

Near the Tibet border in India stands K-2, the second highest peak in the world (28,146 ft.). This view, taken from an altitude of 20,000 feet, helps to show why numerous attempts to scale its heights have been unsuccessful.

Behind the reliability, quietness and smoothness of Delco motor operation lies the basic quality of *rugged construction.* Delco motors are built to last . . . built to take the hard knocks of every-day use and retain their full efficiency. That is why they are particularly well suited for household appliance service. On leading makes of refrigerators, washers, ironers, oil burners, stokers and air conditioners, Delco motors are giving years of satisfactory performance, building good will for manufacturers and dealers alike. Delco Products Division, General Motors Corporation, Dayton, Ohio. In Canada: McKinnon Industries, Ltd., St. Catharines, Ontario.

DELCO MOTORS

INCREASES CAPITAL 1600% IN LESS THAN 3 YEARS WITH Gar Wood



J. L. Spencer, Pres.
SPENCER AIR CONDITIONING COMPANY, Inc.
Gar Wood dealers, Buffalo, N. Y.

HEATING and AIR CONDITIONING UNITS

THE Gar Wood LINE IS COMPLETE

TEMPERED-AIRE
Gas and Oil Fired Complete Winter Air Conditioning System

SPLIT-SYSTEMS
for Radiant Heat and Air Conditioning

BOILER-BURNER UNITS
or Hot Water or Steam Radiation

COMMERCIAL HOT WATER HEATERS
for Buildings and Apartments

AIR CIRCULATORS
for Homes, Stores and Offices

HOUSEHOLD WATER HEATERS
both Storage and Coil Types

CONVERSION OIL BURNERS
for all types of home heating plants

Gar Wood AIRDUX

Standardized duct parts that simplify your work and assure perfect results. Years of research in field and laboratory behind them. Erected on the job with a few simple tools. Complex trunk lines eliminated. No templets to make. Holds costs and delays to a minimum.

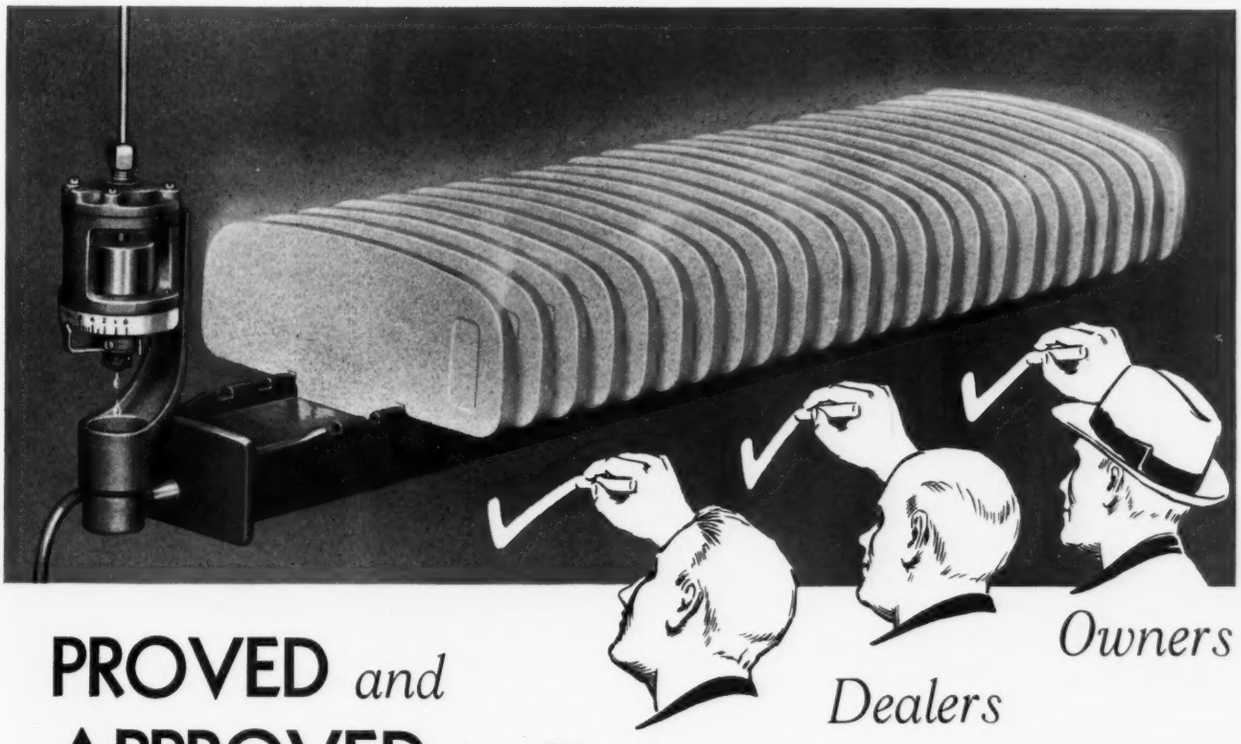
●We are giving Mr. Spencer plenty of credit for his splendid record. He has worked hard and intelligently. But we do maintain that he climbed aboard the right bandwagon when he chose Gar Wood. He proved that experience and elaborate shop equipment was unnecessary to make money with Gar Wood. Starting from scratch, with no more than the price of a small car to invest, he multiplied his working capital 16 times in less than 3 years, paying himself well in the bargain. Think what you can do; with your experience, your equipment, your established reputation. You, too, will find the pioneer Gar Wood well known, well recommended, easy to sell and easy to install. You will need no "engineering" ability. It has all been done for you. And you can get all the help from the factory you will ever need. Think seriously about being the Gar Wood dealer in your community. There will be no better time and no better opportunity to make good money in the air conditioning field. Write today for the facts about Gar Wood in your territory!

Smart delivery and service trucks have made Buffalo even more conscious of Spencer Air Conditioning Company, Inc., and Gar Wood.

Air Conditioning Division
GAR WOOD INDUSTRIES, Inc., DETROIT, MICHIGAN

AUTOMATIC JUNE

HYDRO-METRIC HUMIDIFYING SYSTEMS



PROVED *and* APPROVED *by Engineers*

Owners

Dealers

Automatic June systems have been subjected to the most searching and rigorous tests. They have been installed and observed under varying conditions all over the country. Everywhere, and in every way, Automatic Junes have made good their claim that here is a new principle in re-humidification successfully applied.

For the first time, say heating engineers, is there a complete humidifying system, up to the level of other air conditioning equipment.

For the first time, say dealers, we have humidifying equipment to sell that presents real selling arguments and fully backs them up with satisfactory operation.

For the first time, say home owners, we have delightful humidified air, without weeping windows in extremely cold weather.

Learn more about the revolutionary Automatic June principle of re-humidification. How it graduates indoor humidity with scientific relation to outdoor temperatures. How an evaporator only 2½″ wide affords the same capacity as an evaporating pan of same length and 32″ wide, and so does not impede the circulation of air inside the casing.

The answers to these questions and many others are found in "The Science of Re-Humidifying Indoor Air," with charts and diagrams in color. You may have a copy without obligation. Write today, for your copy together with details of the Automatic June Proposition.

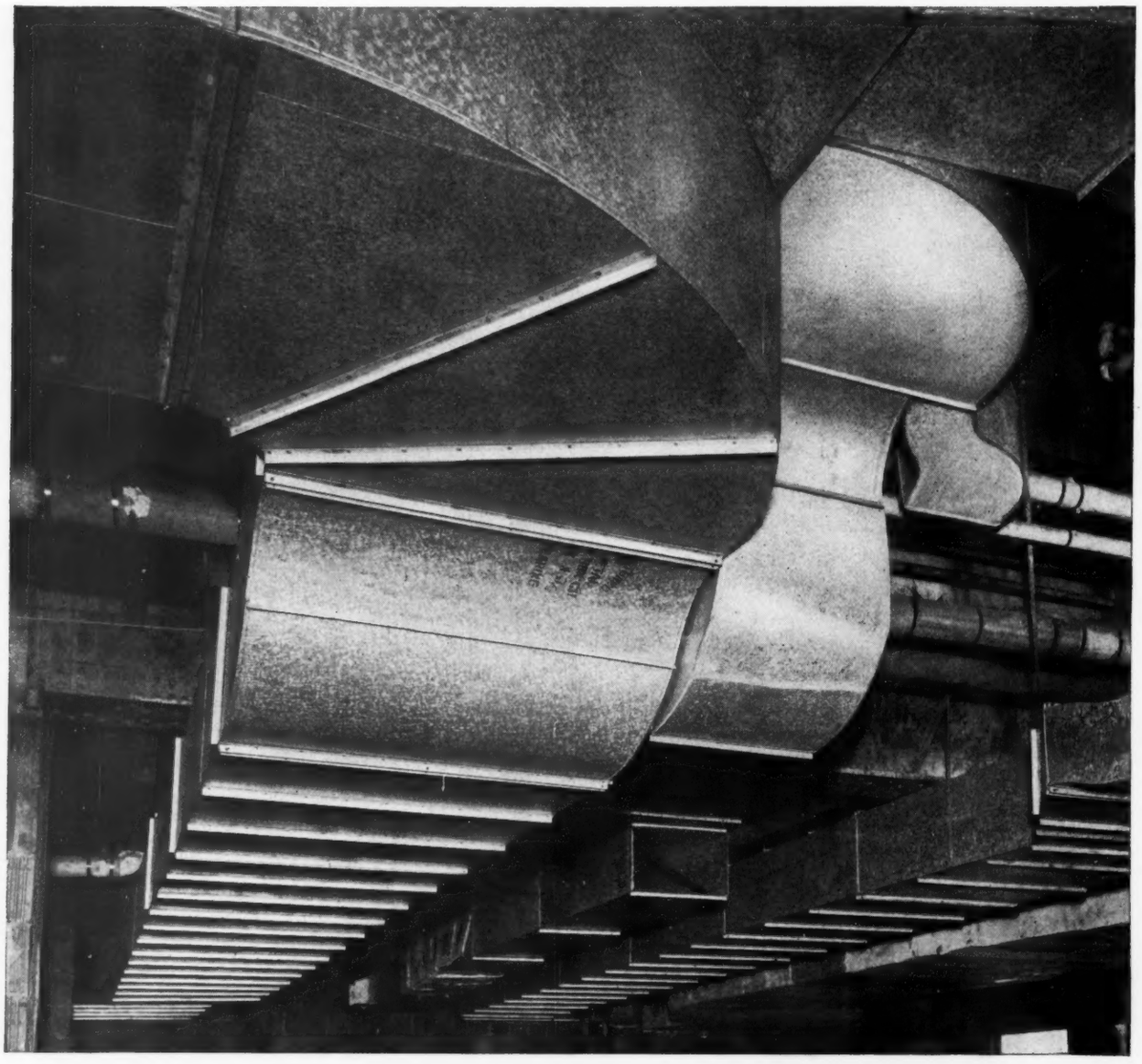
MONMOUTH PRODUCTS CO.
231 EAST 131st STREET, CLEVELAND, OHIO

SEND FOR FREE BOOK

"The Science of Re-Humidifying Indoor Air," graphically illustrated, tells clearly and simply how to meet modern humidification requirements. You need it in your business. Send for your copy today.

MONMOUTH PRODUCTS CO.
231 E. 131st St., Cleveland, Ohio
Please send me book "The Science of Re-Humidifying Indoor Air" and literature describing Automatic June.

Name .....
Business .....
Address .....
City ..... State .....



GALVANIZED SHEETS *with qualities that count in air conditioning*

Air conditioning, with its circulation of moist air through duct systems, calls for steel sheets protected against rust—protected after sheets have been fabricated as well as before.

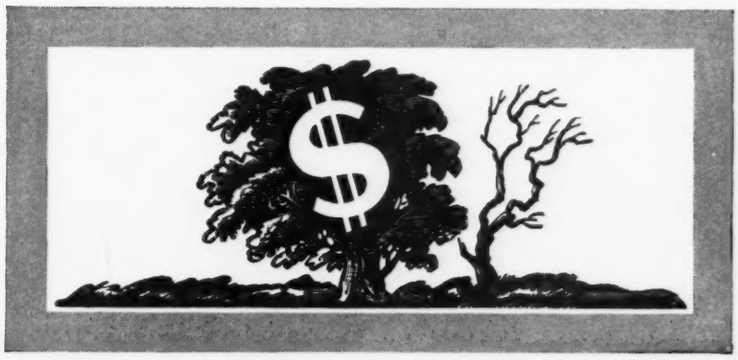
Bethlehem Galvanized Sheets have the tightly adhering coat of Prime Western Spelter so necessary for this. They can be depended on not to flake in forming operations, not to peel along seams and give rust a chance to start. Completed ducts are as thoroughly protected against moisture as an unformed sheet.

Also, the soft, ductile steel base of Bethlehem Sheets permits rapid fabrication. These sheets are the kind that clear the way for doing a fine job at low cost.

For double defense against rust—Beth-Cu-Loy sheets have additional protection of a copper-bearing steel base. This material, high-grade open-hearth steel alloyed with just the proper amount of copper for maximum life, has two to three times the life of plain steels and irons when exposed to atmospheric corrosion.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY



Do you want a

soundly Growing

year 'round business?

This Frigidaire Electric Room Cooler is typical of *present* profit opportunities. There are more in use than all other makes combined.

Last summer Frigidaire Electric Room Coolers skyrocketed to sensational success. Dealers who foresaw the demand for efficient low-cost cooling and stocked Frigidaire Coolers in time, sold out long before the summer was over . . . This summer there is already even more active interest. Don't miss this great profit opportunity.

It is only necessary to look at the Delco-Frigidaire line . . . its competitive prices—its completeness—its wide public acceptance . . . to realize the *present* profit opportunities of the Delco-Frigidaire Franchise.

But of much more importance . . . to the sound conservative business man whom Delco-Frigidaire wishes to have as its front-line partner . . . is the opportunity this Franchise offers for a soundly growing, year 'round business with a future.

To him, Delco-Frigidaire offers a line of products covering the field completely, right in price, right in range of sizes, right in engineering; backed by an organization that has proven its ability to take its dealers to the top.

There's still room for a few business men of this sort in the Delco-Frigidaire picture. Inquiry is cordially invited. Either mail the coupon—or write today.

Compare any other Franchise with these

5 DELCO-FRIGIDAIRE ADVANTAGES

1 The power of the name *General Motors* . . . and the proven record of General Motors in taking its dealers to the top.

2 A *complete* line of heating and cooling equipment . . . offering such *proven* sales arguments as the Thin-Mix Fuel Control and *"Controlled-Cost"* Air Conditioning.

3 The right products at prices so competitive that *no sale need be lost.*

4 Accepted national leadership and widespread public acceptance.

5 Dominant and convincing advertising and sales promotion that tells a competitive story—*both* nationally and locally.

Write for more information about this great Franchise

MAIL COUPON TODAY

Delco-Frigidaire Conditioning Division
General Motors Sales Corporation
Dayton, Ohio—Dept. AA-5

I am interested in your Franchise. Please send me complete information at once.

*Name*_____

*Address*_____

*City and State*_____

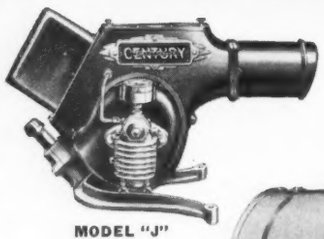
It pays to have this Franchise

DELCO-FRIGIDAIRE

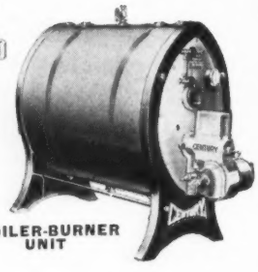
The Air Conditioning Division of General Motors

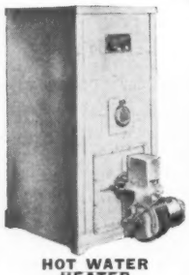
AUTOMATIC HEATING, COOLING AND CONDITIONING OF AIR

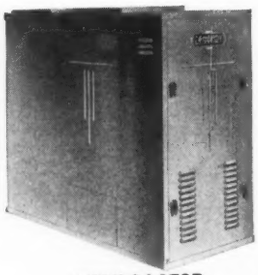
GET IN THE MONEY with CENTURY'S COMPLETE line!



MODEL "J"


BOILER-BURNER UNIT


HOT WATER HEATER


ZEPH-O-LATOR

Century dealers are in the money! They're not only selling more conversion burners than ever before, but are cashing in on complete heating unit sales. Getting twice the dollars and cents volume and twice the profits.

These striking Century units . . . the Century Zeph-O-Lator for warm air conditioned heating . . . and the Century Boiler-Burner Unit for hot water, steam or vapor heating systems . . . offer the acme of engineering simplicity, and set entirely new standards for overall heating efficiency.

In impartial tests they have proved fuel savings up to 50 per cent over ordinary conversion installations . . . and 15 per cent to 25 per cent greater efficiency than most other types of units. Not only that, without sacrifice of workmanship or finest quality materials, they install for practically no more than the cost of the usual furnace or boiler with conversion burner.

No wonder they sell fast. If you want in the money, switch to Century. Sell a complete line. A line that's backed by a sensational nationwide advertising drive and one of the oldest and largest oil burner manufacturers in America. Write today for details of the money-making Century Franchise. It may still be available in your community. The CENTURY ENGINEERING CORP., Cedar Rapids, Iowa.

Special If you act at once, there's a special Century dealer offer open. Get specifications, details, illustrated literature on all or any part of the complete Century line. Mail your letter at once.

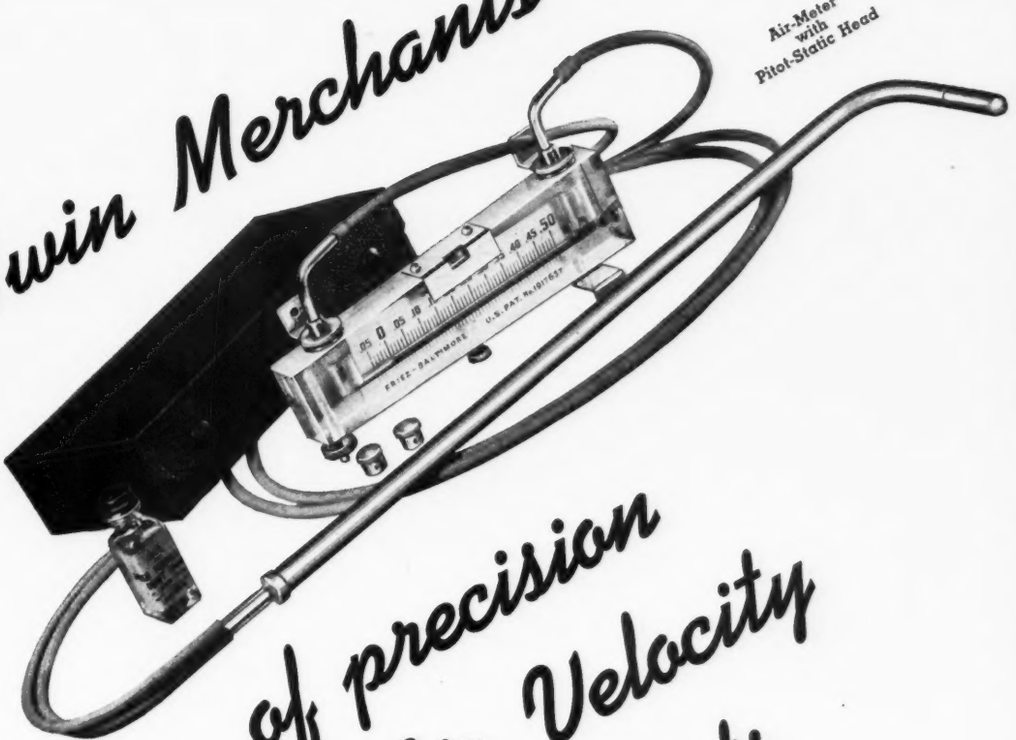
CENTURY

Conversion Burners . . Boiler-Burner Units . . Warm Air Furnace Units with Air Conditioning . . Hot Water Heaters

FRIEZ

OF BALTIMORE

Twin Merchants



Air-Meter with Pitot-Static Head

of precision in Air Velocity Measurements

Anemometer

Julien P. Friez & Sons, Inc.
Baltimore, Maryland

BE ON THE JOB

when the crowd comes

. . . they're all heating and air-conditioning prospects

■ A new house, "opened for inspection," attracts hundreds of people who are thinking of buying, building or modernizing a home. . . They are your livest prospects, because they're getting ideas, facts and information to use later on. So *be on the job* at the opening of *every* new house for which you had the heating contract. Get acquainted with all the people you can. Hand out business cards. Explain the operation and advantages of your heating and air-conditioning system. There is no better place—no better opportunity to meet a lot of interested prospects and to do some adroit selling. . . If you handle a Dust-Stop equipped unit, you'll find most of the people highly responsive because of the Dust-Stop national advertising that has appeared in their favorite magazines. Don't miss a single one of these made-to-order sales opportunities; and don't miss getting full details about Dust-Stop. . . Use the coupon below.

Owens-Illinois Glass Company . . . Toledo, Ohio.

COUPON

OWENS-ILLINOIS GLASS COMPANY
Industrial and Structural Products Division
301 Madison Avenue, Toledo, Ohio

Please send, without obligation, illustrated details about Dust-Stop Air Filters.

Name _____

Address _____

City _____ *State* _____

DUSTOP
REPLACEMENT-TYPE
AIR FILTERS

New—

QUIET MAY

COMPLETELY ENGINEERED

OIL FURNACE

(Designed to Meet Competitive Price Situation)

GETS AMAZING RECEPTION

SINCE its first showing at the recent Philadelphia Oil Burner Institute Show, orders have been piling in right and left, among them a FIRM commitment of 150 units from one of the biggest independent oil and oil-burning equipment dealers in the United States.

This is what just one of many new Quiet MAY dealers think of how they can "Go To Town" this year with the"Quality Made" newly priced Quiet MAY line.

The line includes—

The new low-priced completely engineered Quiet MAY Oil Furnace (year-round tankless domestic hot water)—

The new low-priced completely engineered Heat-an-Aire Conditioner (split system with year-round tankless domestic hot water)—

The new low-priced Quiet MAY Warm Air Conditioner—

Two new competitively priced Quiet MAY Oil Burners (same outstanding quality and exclusive features as heretofore)—and Deluxe Quiet MAY models to round out the needs of a dealer to meet any customer demand that he might find in his territory.

For open or inadequately covered territory, address

MAY OIL BURNER CORPORATION

Franchise Department Baltimore, Maryland

Quiet May Is Quality Made

MAY OIL BURNER CORPORATION AA5-37
BALTIMORE, MARYLAND

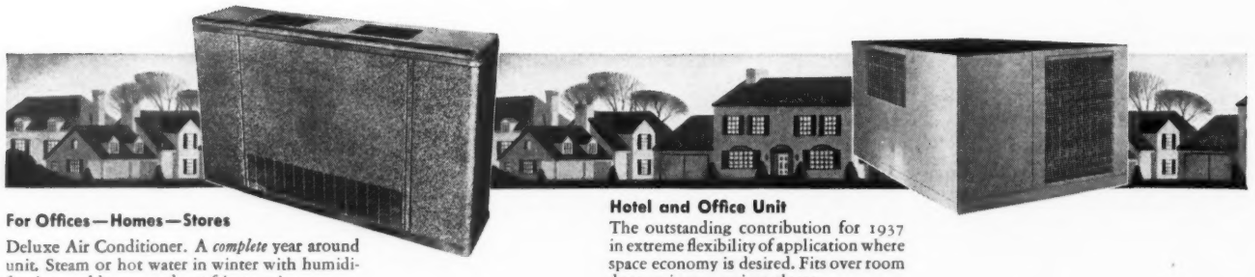
Gentlemen: Please let us have more information about Exclusive QUIET MAY FRANCHISE IN OUR TERRITORY.

*Name*_____

*Address*_____

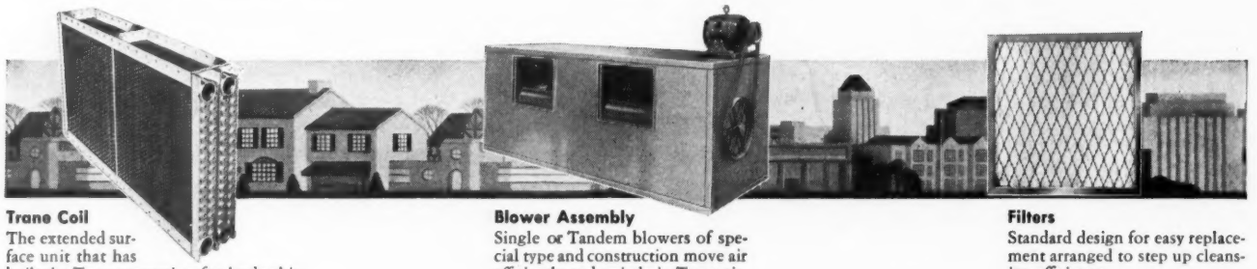
*City*_____ *State*_____

TRANE March



For Offices—Homes—Stores
Deluxe Air Conditioner. A *complete* year around unit. Steam or hot water in winter with humidification—cold water or d.e. refrigerant in summer.

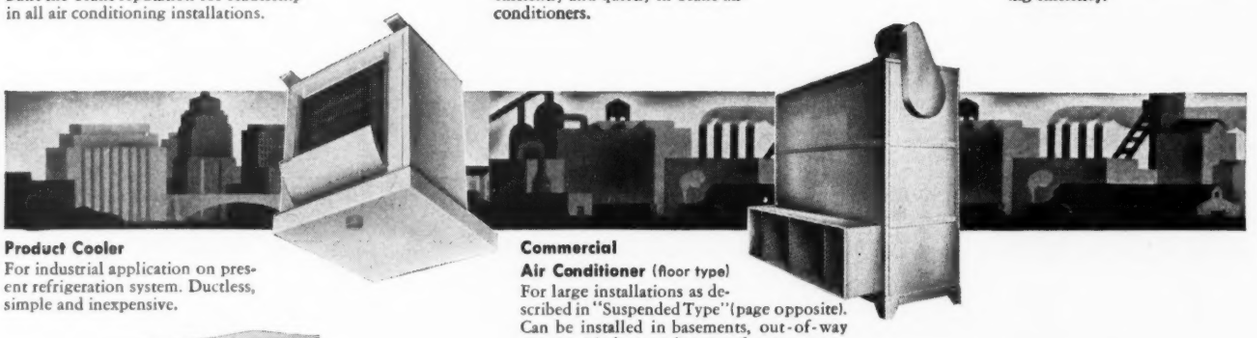
Hotel and Office Unit
The outstanding contribution for 1937 in extreme flexibility of application where space economy is desired. Fits over room door or in convenient closet.



Trane Coil
The extended surface unit that has built the Trane reputation for leadership in all air conditioning installations.

Blower Assembly
Single or Tandem blowers of special type and construction move air efficiently and quietly in Trane air-conditioners.

Filters
Standard design for easy replacement arranged to step up cleansing efficiency.



Product Cooler
For industrial application on present refrigeration system. Ductless, simple and inexpensive.

Commercial Air Conditioner (floor type)
For large installations as described in "Suspended Type" (page opposite). Can be installed in basements, out-of-way rooms with duct work to comfort zones.

Where Water Costs are High
The evaporative condenser by Trane has developed savings in water costs up to 95%. Eliminates cooling towers, tower pump, and their housing space cost. Capacities 12-110 tons.

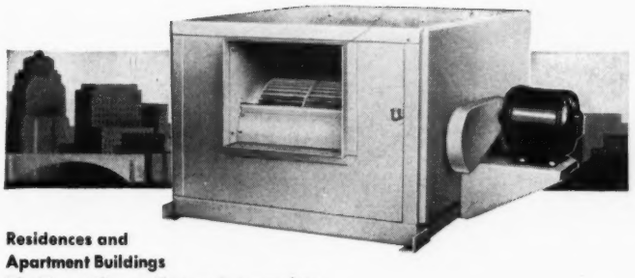
New Small Size 1-10 tons
Insistent calls for smaller unit evaporative condenser in metropolitan high water cost locations bring forth the Series "J" self-contained and very compact.

THERE IS A TRANE SYSTEM FOR EVERY PROBLEM • Air conditioning consultants, architects, engineers, and contractors have found in the units pictured above many an answer to many a perplexing problem of installation. Trane air conditioners give full latitude to the custom-fitting required on every major job. A list of recent installations reads like the roll call of American Business and like any broad list, runs from hamburgers to grand opera—from Cape Cod Cottage to Skyscraper. Trane technicians in 64 principal cities can help you wherever your job may be.

☆ HEATING ☆ COOLING ☆ VENTILATING ☆ HUMIDIFICATION ☆ DEHUMIDIFICATION

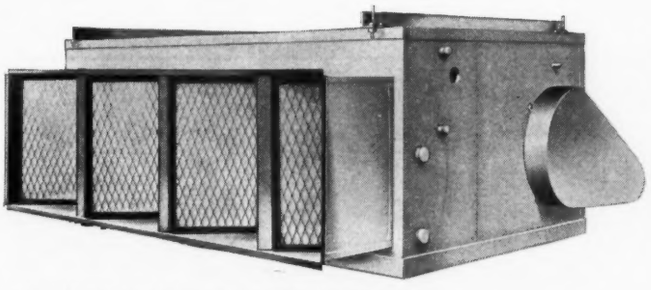
THE TRANE COMPANY, LACROSSE, WISCONSIN

# of Progress in AIR CONDITIONING



Residences and Apartment Buildings

The Trane Climate Changer is a complete year 'round unit occupying small space. In summer: cools, cleans, dehumidifies and circulates the air. In winter: heats, cleans, humidifies and circulates. Overcomes cold spots—saves furniture and hangings.



COMMERCIAL AIR CONDITIONER

Large Suspended Type

Where space is at a premium in Hotels, Restaurants, Taverns, Offices, Apartments and Factories. An outstanding development favored by leading architects and engineers is the suspended model featured above. May be hung in out-of-the-way places and is notable in its adaptability to the "unusual" large space problem. May be used for heating and/or cooling—humidification optional. Water or direct expansion. Unobtrusive and remarkably efficient. May be shipped K. D. in larger sizes. Low and medium capacity units for residences and apartments using duct work.

★ ★ ★ ★ ★ **TRANE**

Manufacturers of *correlated equipment and systems for complete air conditioning of Residences, Large Buildings, Factory Buildings, Manufacturing Processes, Public Carriers.*

THE TRANE COMPANY OF CANADA, LTD., TORONTO

VERSATILITY 1937 KEYNOTE

● The extraordinary increase of interest in Trane air conditioners in 1936 evidenced by the leading professional consultants has encouraged the Trane designing and engineering staff to redouble their efforts for 1937.

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PACIFIC GAS RADIATOR COMPANY

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Forced Air Heating Facts From the Research Residence

By S. Konzo
Special Research Associate
Engineering Experiment Station
University of Illinois

These discussions of some of the different types of duct systems are for the purpose of presenting the essential details of each, and to compare their respective advantages and disadvantages. Very little actual test data are available on the performance of these different systems. This discussion completes the series dealing with duct systems.

High Velocity Duct System

Introduction

IN THE preceding article two special forms of duct systems were considered. These two systems were designated as: (a) Extended plenum duct system, and (b) Overhead duct system. In this article the third of these special forms, which is designated as (c) the High velocity duct system, will be considered in detail. In addition, a summary of available data on friction pressure losses through various types of duct fittings is presented in graphic form.

C. High Velocity Duct Systems

Some attempts have been made to materially decrease the size of all ducts in a duct system, although the results obtained have not been entirely satisfactory. Undoubtedly additional attempts will be made to adapt to small heating installations a method which has been extensively used in larger industrial installations. During the last eight years there has been a gradual tendency towards the use of smaller ducts and higher air velocities.

When "booster" fans were first used, the commonly accepted value for main duct air velocity was approximately 500 feet per minute. Later, with the increasing use of centrifugal fans, the allowable main duct velocities increased, first to 600 feet per minute, and then to 750 feet per minute. Today, some designs are being based on air velocities exceeding 1000 feet per minute.

For the purpose of this discussion, all velocities exceeding approximately 1000 feet per minute will be considered as "high velocity," although for industrial purposes a velocity of 1000 feet per minute would be regarded as medium. The limitations in the available space in the basement and in studdings, together with the larger cost accompanying the use of the large ducts, has made the idea of using small-sized ducts a very appealing one to many designers. A discussion of the main limitations should be of some interest and are itemized as follows:

Reduced Cfm

1. The most obvious method of decreasing the sizes of ducts would be to reduce the quantity of air handled in the system. For a given quantity of heat to be supplied to a room, this can be done by increasing the temperature of the air at the warm air register. The heat conveyed per hour by the circulating air can be expressed by the equation:

$$H = 0.24\ \text{Cfm} \times 60 \times d_R\ (T_R - T_{IN}) \qquad (1)$$

Where

H = heat in Btu. per hr.

d_R = density of air at temperature T_R, in lb. per cu. ft.

T_R = register air temperature in deg. F.

and

T_{IN} = inlet temperature to return connection in deg. F.

This equation can be simplified and transformed to:

$$\text{Cfm} = H \times \text{Factor} \qquad (2)$$

where the values of the Factor are as shown in Table 1.

In most design calculations a value of 135 deg. F. is used for the register temperature, in which case the Factor is 0.0148. Since the quantity of air required is directly proportional to the magnitude of the Factor, a register temperature of 150 deg. F. would require an air volume only $\frac{0.0125}{0.0148}$, or 85 per

cent of that required for 135 deg. F. register air. Similarly temperatures of 160 deg. F. and 175 deg. F. for the register air would require air volumes only 77 per cent and 68 per cent of that required for a register air temperature of 135 deg. F.

What High Reg. Temp. Means

The use of higher register air temperatures is, however, accompanied by:

a. Smaller number of air recirculations in the rooms
b. Lower efficiency in heat transmission in the furnace unit
c. Greater temperature gradients from floor to ceiling in the rooms.

In other words, the reduction in air volume accompanying the use of higher register air temperatures, is not conducive to the best operating conditions and hence the method is somewhat limited in its application. The main advantages of the method are that a smaller fan is required and the cost of fan operation is smaller.

2. The next obvious method of decreasing duct sizes would be to use high air velocities in the ducts. However, some of the problems that may be only of minor importance for duct velocities of 600 feet per minute become of major importance when the air velocities exceed 1000 feet per minute. In the first place, although an average air velocity in the ducts of 1000 feet per minute may be specified,

TABLE 1

Value of Factor to Be used in Equation: Cfm = H x Factor

(Based on a return air temperature of 65 deg. F. and barometric pressure of 29.92 in. of Hg.)

Register Air Temperature	Value of Factor
90	0.0384
100	0.0279
110	0.0221
120	0.0184
130	0.0159
140	0.0140
150	0.0125
160	0.0114
170	0.0105
180	0.0097
190	0.0091
200	0.0085

the actual air velocity from point to point in the duct may vary considerably from that value. The air velocities around bends, disturbances, dampers, and connections may be extremely non-uniform and may be as much as 50 per cent greater than the average value. The use of turning vanes, diffusers, and stream-lined transitions is recommended not only to reduce frictional losses, but also to reduce the non-uniformities in the air velocities.

Air Noise

3. In the second place, air noises may become an appreciable factor for air velocities exceeding 1000 feet per minute. In this connection it should be noted that the possibilities of creating objectionable air noises are greater when the high velocities occur near the register opening into the room. On this account particular attention should be paid to the air velocity at the register face. The use of turning vanes at the stack-head and diffusers would tend to equalize the air flow and hence lessen the possibility of obtaining air noises, created by high velocity jets of air impinging on sharp surfaces. However, the use of low velocities at the register face does not preclude the use of high velocities in the main ducts.

Frictional Resistance

4. The main disadvantage of high velocity systems is that the resistance to air flow and the power

TABLE 2

Increase in Resistance and Power Consumption Accompanying Increase in Duct Velocity

Increase in air velocity in duct, per cent	Increase in resistance to air flow, per cent	Increase in power requirement, per cent
5	10	16
10	21	33
20	44	73
25	56	95
30	69	120
40	96	174
50	125	237
60	156	310
70	189	391
80	224	483
90	261	586
100	300	700

required to move the air are both large. In a given duct system, the *RESISTANCE varies as the square of the VELOCITY*. That is, if the air velocity is increased 25 per cent, the resistance is increased by 56 per cent, as shown in Table 2. Furthermore, in the same duct, the *POWER REQUIREMENT varies as the cube of the VELOCITY*.

It may be noted from Table 2 that for an increase in air velocity of 25 per cent, the theoretical power requirement is practically doubled. The values shown in the third column of Table 2 indicate the extremely large increase in the theoretical power requirement even for moderate increases in the air velocity. Even if small fans were available for delivering air against high static pressures, the increased operating cost of the fan accompanying high air velocities may more than offset the advantages obtained by using small ducts.

5. High velocity duct systems require more careful engineering, better stream-lining of the ducts, and complete performance data on the fan to be used. High velocity systems are not recommended for general practice and should be installed only after a careful consideration of the many factors enumerated.

Pattern Development for Air Conditioning Fittings*

By William Neubecker
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Compound, Curved Transition, Offset Rectangular to Rectangular in Given Dimensions

FIG. 13 shows the method or rule for drafting a transition offset of this type so that an equal area is maintained throughout, using graceful, frictionless curves. In this connection will be explained how large sized offsets are laid out, by means of a small reduced drawing and then laid out direct on the sheet metal, full size, by the simple use of a common divisor and multiplier.

In this problem the size of the duct is 12 × 24 inches. The transition is to fit in a space 6 ft. 8 inches long and 4 ft. deep with a drop of 24 inches, as shown in the side and front elevations. We then will reduce to inches

Duct Size	Length	Depth	Drop
12x24	80	48	24

Divide these figures by any divisor (so as to make a small drawing) say 8, then the sizes would be as follows:

Duct Size	Length	Depth	Drop
1½x3	10	6	3

Assume that the side elevation has been drawn to these reduced dimensions. Then the duct size in front elevation would be 1½ × 3 inches; the length of the offset 10 inches; the depth 6 inches and the drop 3 inches. As *A*-1 in the reduced drawing will be 1½ inches and *E*-*C*, 3 inches, different radii will be required to draw the curves *A* to *E* at the top and *C* to 1 at the bottom.

Construct the rectangle *A*-*B*-*C*-*D* one-eighth of 48 × 80 inches or 6 × 10. Lay off on the line *A*-*D* the narrow side of the duct or 1½ inches as shown from *A* to 1 Divide this space in two parts and obtain point *a*.

On the line *C*-*B* lay off the wide side of the duct, or 3 inches as shown from *C* to *E*.

Now take the distance 1 *a* in the narrow side and set it off on the wide side as indicated from *C* to *b*. Draw a line from *b* to *a* and space it in four equal spaces as shown from *b* to 7 to 8 to 9 to *a*. At right angles to *a*-*b* from point 7, draw a line to intersect *C*-*E* extended at *F*. In a similar manner, at right-angles to *a*-*b* draw a line from point 9, to intersect the line *A*-1 extended at *G*. Draw a line from *F* to *G*. Now using *F* as a center with *F*-*C* as radius draw an arc to intersect the line *F*-*G* at *d*. Using *G* as a center with *G*-1 as radius draw an arc to meet *d* on the line *F*-*G*. For the curve at the top take one-half of the wide side *C*-*E* as *Ce* and set it off on the narrow side *A*-1 at the top and obtain point 1. Draw a line from 1 to *e* and divide it into four equal spaces as shown from *e* to *f* to 8 to *i* to 1. From point *f* at right angles to *e* 1 draw a line to intersect the line *C*-*E* extended at *J*. From point *i* at right angles to *e* 1 draw a line to intersect the line *A*-1 extended at *H*. Draw a line from *J* to *H*. Using *H* as a center with radius equal to *H*-*A* draw an arc to meet the line *J*-*H* at *o*. Using J as a center with radius equal to *J*-*E* draw an arc to meet point *o* on the line *J*-*H*.

A-1 *C*-*E* then shows the true curves for the transition offset having equal area throughout. As before explained, the full size dimensions have been reduced to one-eighth size so that the small sketch of 6 × 10 inches can be drawn, from which the full size offset can be laid out direct on the sheet metal. Having used eight as the divisor in reducing the full size dimensions, we now use eight as the multiplier in enlarging the reduced dimensions on the 6 × 10 drawing.

Lay out the full size offset as follows: Lay off the full size rectangle on the metal sheet 48 × 80 inches and assume *A B C D* to be the metal sheet. Set off from *A*, 12 inches as from *A* to 1. At the right lower end set off 24 inches from *C* to *E*. On the reduced drawing draw a line from *E* to *A*. Do likewise on the metal sheet. From the small drawing take the distance from *E* to *U* (on the line *E*-*A*) in the dividers and step off this distance 8 times on the line *E* to *A* on the metal sheet and obtain point *U*. In similar manner in each instance take the distance *Uo*, *oV* and *VA* (in the dividers) from the small drawing and step off 8 times these distances on line *E*-*A* on the metal sheet. From points *V* and *U* on the metal sheet draw short lines.

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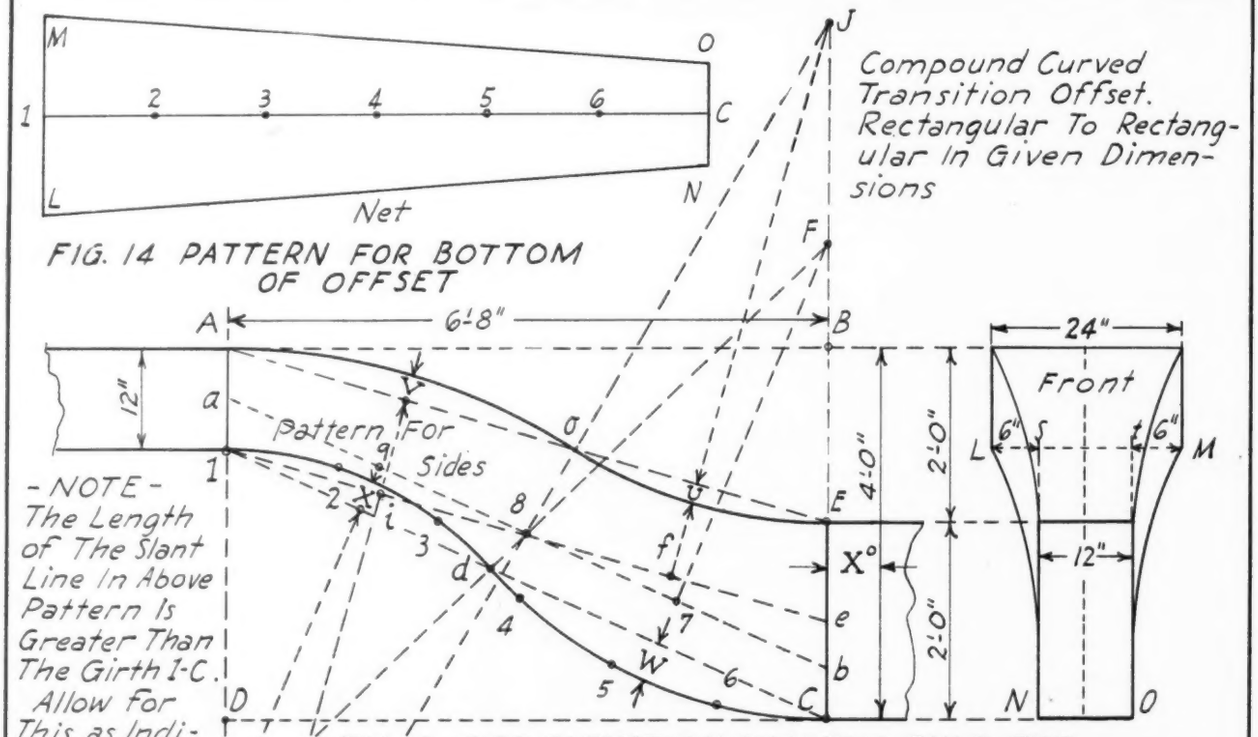

Compound Curved Transition Offset. Rectangular To Rectangular In Given Dimensions

FIG. 14 PATTERN FOR BOTTOM OF OFFSET

FIG. 13 SIDE ELEVATION SHOWING RULE FOR DRAFTING TRANSITION OFFSET TO MAINTAIN EQUAL AREA THROUGHOUT USING GRACEFULL FRICTIONLESS CURVES.

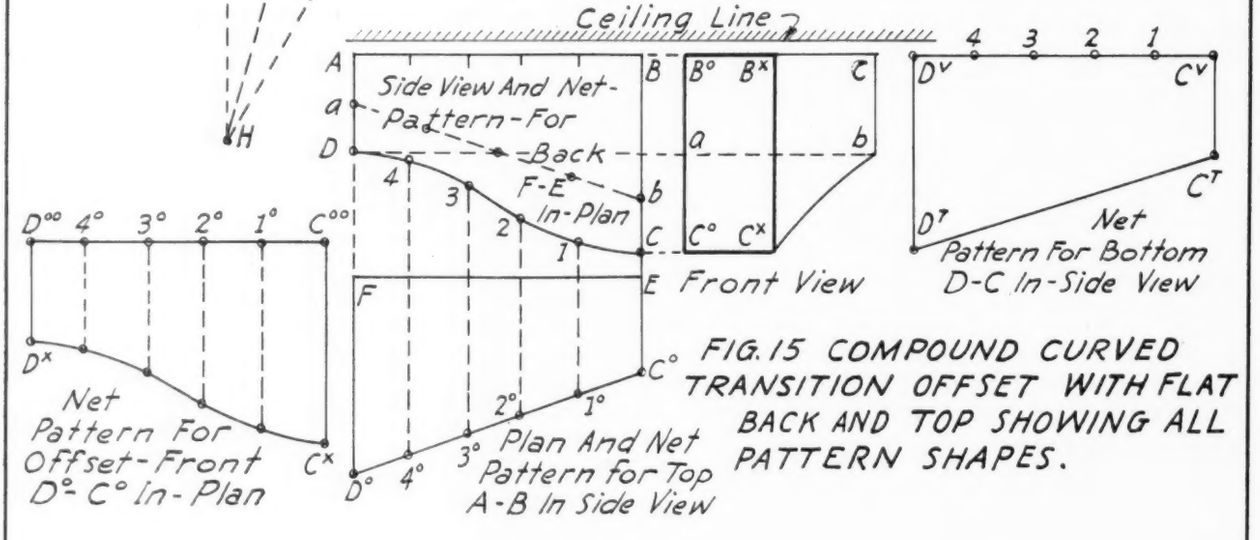

FIG. 15 COMPOUND CURVED TRANSITION OFFSET WITH FLAT BACK AND TOP SHOWING ALL PATTERN SHAPES.

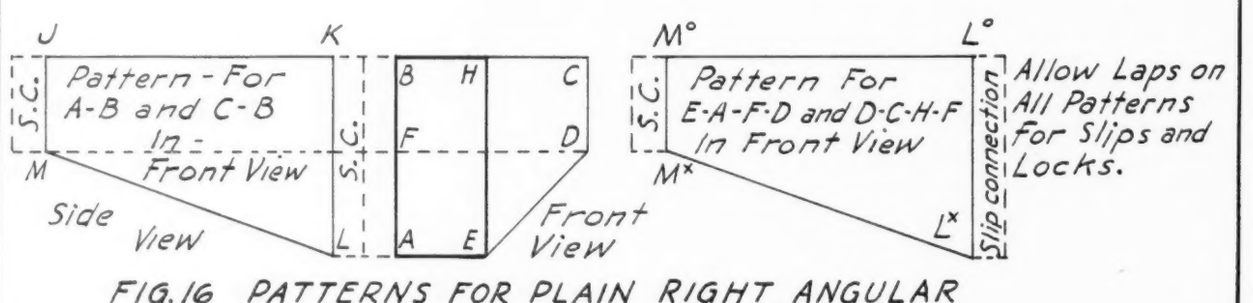

FIG. 16 PATTERNS FOR PLAIN RIGHT ANGULAR TRANSITION OFFSET

Now at right angles to *E-A* take the distance of *U* between the arrows on the reduced drawing and set off 8 times this distance *below* the line *E-A* on the metal sheet from point *U*. In similar manner take 8 times the distance between the arrow points at *V* in the reduced drawing and set it off on corresponding right angle line on the metal sheet *above* the line *E-A* from point *V*. Through the points of intersections *AVoUE* on the metal sheet the tapering curve is drawn, using a pliable wooden straight edge. The same procedure will produce the lower curve from 1 to *C*.

A line is drawn from *C* to 1 in the reduced drawing. Similar line *C* to 1 is drawn on the metal sheet, and on this line is set off eight times the distances of *CW*, *Wd*, *dX* and *X*-1 measured from the reduced drawing. At right angles to the line *C*-1 on the full-size sheet from points *W* and *X* draw short lines. Now take the distance of *W* between arrows in the reduced drawing and set off eight times this distance *below* the line *C*-1 on the metal sheet from point *W*. In similar manner take eight times the distance between the arrow points at *X* in the reduced drawing and set it off on corresponding right angle line on the metal sheet *above* the line *C*-1 from point *X*.

Through the points of intersection 1*XdWC* on the metal sheet the tapering curve is drawn using a pliable wooden straight edge. The outline on the metal sheet then represents a true full-size cheek elevation, which will also be used as the cheek pattern. Referring to the front elevation it will be noticed that there is a flare of 6 inches on either side of the cheek, as shown by *Ls* and *tM*, which the cheek will easily turn in a length of 6 ft. 8 in. Single edges must be allowed along top and bottom curves used in connection with Pittsburgh lock.

This method of applying the reduced drawing in laying out large transitions of any shape takes longer to explain than it does to lay out the work in practice, but when one understands the principles of using the divisor and then the multiplier, it will be found to be more accurate than making reductions and enlargements by scale drawings. When large offsets occur in practice the full cheek can be divided into the desired number of parts to facilitate assembling and erection joining the sections together by the use of the drive cleat.

To obtain the pattern for the bottom of the transition, space the lower curve, which was laid out full size, on the metal sheet from *C* to 1, into equal divisions and place them on any line as *C*-1 in Fig. 14 as shown by similar numbers. Through 1 and *C* draw perpendicular lines making 1-*M* and 1-*L* and also *CO* and *CN* equal respectively to one-half of *LM* and *NO* in the front view Fig. 13. Draw lines in Fig. 14 from *M* to *O* and *L* to *N*, which shows the net pattern shape for the lower curve. The pattern for the upper curve of the full-size duct *AE* in side elevation in Fig. 13 is obtained in a similar manner. Edges for Pittsburgh locks must be added to the pattern in Fig. 14.

The method of laying out the pattern just described is not geometrically accurate, but is accurate enough for all practical purposes. If one measures the *slant* line *LN* in Fig. 14 it will be found to be slightly longer than the curve 1-*C* in Fig. 13, because the girth of this curve was placed on the *horizontal* line 1-*C* in Fig. 14. To make up this loss a slight addition is added along *EC* as indicated by *X*°.

Compound Curved Transition Offset with Flat Back and Top

Fig. 15 shows a side and front view, also the plan of a transition of this type. *A-B-C-D* shows the side view with a flat top against the ceiling line. *AD* is the narrow side of the offset and *BC* the wide side. When drawing the graduated curve from *D* to *C* take half of *AD* as *Da* and set it off on *CB* from *C* to *b*. Draw a line from *b* to *a* which divide in four parts and then proceed to find the radii for striking the curves in precisely the same manner as was explained in finding the lower curve 1-*C* in Fig. 13.

Below the side view in Fig. 15 draw the plan indicated by *FEC°D°* making *EC°* the narrow side of offset and *FD°* the wide side, *FE* indicating the flat back. In the front view $B°B^xC°C^x$ represents the section of the offset on the line *BC* in side view and *B°abc* the section on the line *AD*. As the back of the offset is flat as indicated by *FE* in plan, then *A-B-C-D* in side view becomes the pattern for the back of the offset.

As the top of the duct is also flat, as indicated by *AB* in side view, then *EFD°C°* in plan become the pattern for the top of the offset. The only two paterns which require developing will be the bottom along *DC* in the side view and the front along *D°C°* in plan.

To obtain the pattern for the bottom *DC* in side view, space this curve in equal divisions as shown by the small figures *C* to 1, 2, 3, 4 and *D*. From these points drop vertical lines to intersect the line *C°D°* in plan. Take off the divisions from *C* to *D* in side view and set them off on the horizontal line at the right as shown from D^v to C^v. From D^v and C^v drop perpendicular lines making D^vD^t *and* C^vC^t equal respectively to *FD°* and *EC°* in plan. Draw a line from D^T to C^T, which will complete the net pattern for bottom of offset. For the pattern for front of offset take the divisions from *D°* to *C°* in plan and set them off on the line *D°°C°°* at the left as shown by similar numbers. From these small figures at right angles to *D°°C°°* draw lines indefinitely.

Now measuring in each instance from the line *FE* in plan, take the various distances to points on *C°D°* and set them off on corresponding letters and figures, measuring in each instance from the line *C°°D°°*. Trace the curved line through points so obtained, then will $D^xC^xC°°D°°$ be the desired pattern. As all patterns are shown net, laps must be allowed for either double seaming or Pittsburgh lock.

Right Angular Transition Offset

Fig. 16 shows the method of laying out the patterns for a plain right angular transition offset. This rule is applicable, regardless of whether the sizes of both ends of the offset are equal or unequal, providing the sides of the offset run parallel to each other. In other words, regardless of whether one end of the offset is rectangular and the other end square, the sides must be parallel to each other, as shown in front view,

(*Continued on page* 80)

A Resume of Summer Cooling in the Research Residence† [Part 2]

By M. K. Fahnestock

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In part I of this report (April) the author described the Research Residence, the test apparatus, and general outline of tests. In this issue the testing procedure for ice, mechanical refrigeration, water from the city mains—with and without night air cooling—are set forth in detail. The results obtained are reported in the text and shown in chart form.

Test Procedure Using Ice for Cooling

ALL of the windows, including those in the attic, remained closed continuously day and night, and the cooling plant was started when the effective temperature indoors rose to 75 deg. F. irrespective of the outdoor temperature. This usually occurred when the indoor dry-bulb temperature reached a value of between 78 and 82 deg. F., depending upon the relative humidity. After starting the plant the indoor dry-bulb temperature remained practically constant within a range of 78 to 80 deg. F., but, due to the reduction in the moisture in the air, the indoor effective temperatures usually was lowered to approximately 72 deg. F. The operation of the plant was continued until the outdoor dry-bulb temperature was several degrees below that indoors.

Water, chilled with ice in the bunker, entered the cooling coil at about 35 deg. F. A constant quantity of approximately 396 gal. of water per hour was circulated and the average temperature of the water in the coil was about 39 deg. F. Under these operating conditions the temperature of the air at the inlet registers to the rooms did not fall below 60 deg. F. The cooling load on the residence over any interval of time was determined by the amount of ice melted. No air, other than that which leaked in by natural infiltration, was provided for ventilation or cooling at night.

Test Procedures Using Mechanical Refrigeration

During all tests, with and without cooling with outdoor air at night, the windows in the attic remained opened and the windows on the first story remained closed. For the purpose of cooling with outdoor air at night, eleven windows on the second story and the door at the head of the stairs leading to the attic were opened.

A. Cooling With Mechanical Refrigeration During the Day and the Circulation of Outdoor Air at Night

At 7 a. m. the fan, which had been delivering outdoor air through the duct system, was stopped, and the windows on the second story and the attic and basement doors were closed. When the temperature at the thermostat on the second story rose to 81 deg. F., the cooling plant, including the condensing unit, and the circulating fan, was started. The fan delivered 5.5 air changes per hour, of which 4.5 were recirculated air, and one was air admitted for ventilation. The condensing unit operated with thermostatic on and off control, and the fan ran continuously, maintaining an average temperature in the residence of about 80 deg. F. In the evening or during the night when the outdoor effective temperature became slightly lower than the indoor effective temperature, the condensing unit was stopped, and the windows on the second story, and the attic and the basement doors were opened; and the dampers in the duct system were set so that the fan delivered outdoor air thrugh the house, equivalent to 9.5 air changes per hour, until 7 a. m.

B. Cooling With Mechanical Refrigeration Without the Circulation of Outdoor Air at Night

The second-story windows remained closed during the day and night, and the fan ran continuously delivering through the cooling system the recirculated air and the air admitted for ventilation. The condensing unit operated with thermostatic on and off control, maintaining an average temperature in the residence of about 80 deg. F.

Test Procedure Using Water from the City Mains

During all of the tests the windows in the attic remained opened day and night, and the windows on the first story remained closed. No tests were made in which artificial cooling during the day was not supplemented with the circulation of air from the outdoors at night. The windows on the second story and the attic and basement doors were closed at 7 a. m., and the damper and door in the duct system changed so that the fan, which had been delivering outdoor air through the house, started delivering recirculated air and air admitted for ventilation. The total quantity of air delivered was approximately 1,300 cu. ft. per minute,

†The Research Residence in Urbana, Illinois, was built, furnished, and completely equipped specifically for research work in Warm-air heating by the National Warm Air Heating and Air Conditioning Association in December, 1924.

which was equivalent to 5.5 air changes per hour and of this amount, 4.5 air changes were recirculated air, and one air change was ventilating air from outdoors. The fan ran continuously during the day and the amount of cooling was regulated by the flow of water through the cooling coil. This was controlled by the thermostatically actuated motor valve located in the outlet water line from the coil. The thermostat located in the hall on the second story was set for 80 deg. F., and the cooling plant was allowed to operate to maintain that condition, until the effective temperature outdoors reached a value equal to the effective temperature indoors. The water valve was then closed, the second story windows, and attic and basement doors opened; and the damper and door in the duct system arranged so that the fan delivered outdoor air through the house at a rate of 2,300 cu. ft. of air per minute, or 9.7 air changes per hour. This method of operation was continued until 7 a. m., when the arrangement was again changed for artificial cooling during the day.

Test Procedure for Circulation of Outdoor Air at Night Without Artificial Cooling During the Day

Numerous tests of this type were made and have been reported in detail in a research paper of the American Society of Heating and Ventilating Engineers, and only several of the most important arrangements will be mentioned here.

A. Circulation of Outdoor Air at Night With Attic Fan

The attic windows remained open and the first-story windows remained closed at all times. At 6 p. m. the second-story windows were opened and the damper at the inlet to the fan was placed in position *A*, as shown in Fig. 4, and the fan started. When in this position the fan delivered air from the first and second stories into the attic whence it passed to the outdoors. The

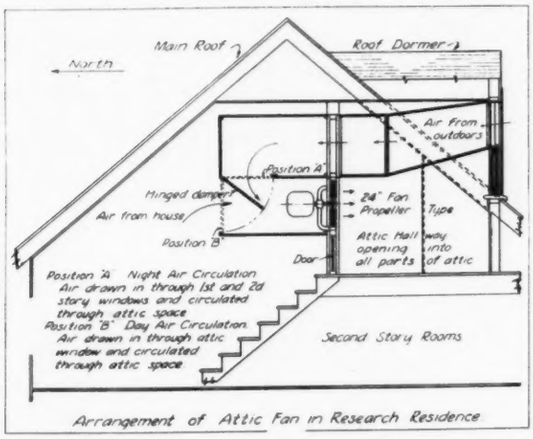
Main Roof
Roof Dormer
North
Air From outdoors
Position 'A'
Hinged damper
Air from house
24" Fan Propeller Type
Position 'B'
Attic Hallway opening into all parts of attic
Door
Position 'A' Night Air Circulation Air drawn in through 1st and 2d story windows and circulated through attic space
Position 'B' Day Air Circulation Air drawn in through attic window and circulated through attic space
Second Story Rooms
Arrangement of Attic Fan in Research Residence

Fig. 4. Arrangement of attic fan for night air cooling. Note special damper.

fan was allowed to run until 6 a. m. on the following morning when it was stopped; the damper at the inlet was placed in position *B* and the second story windows were closed. The house remained closed during the day, and no attempt was made to control the indoor temperature.

B. Circulation of Outdoor Air at Night With Basement Fan

Two series of tests using the basement fan or the fan in the main duct system were made with two different arrangements of window openings at night. In one series the windows were fully opened on only the second story, while in the other series they were fully opened on both the first and second stories. The attic windows remained opened at all times. In both cases, at 6 p. m. the basement door, the attic door, and windows on either the second story or on both the first and second stories, were opened. The basement fan was started and during the night it delivered approximately 2,200 cu. ft. per min. or 9.3 air changes per hour to the rooms

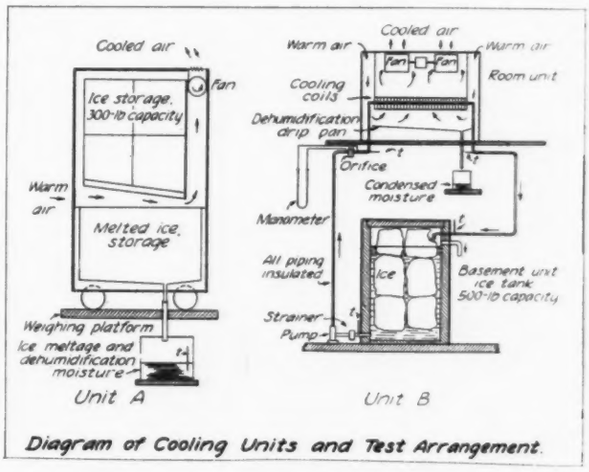

Fig. 5. Diagram of cooling units and test arrangement.

through the duct system. At 6 a. m. the windows and doors were closed, the fan was stopped, and no attempt was made to control the indoor temperature during the day.

Test Procedure With Unit Room Coolers

Both unit room coolers *A* and *B* shown in Figs. 5 and 6, were operated with a thermostat which served to start and stop the air-circulating fans in accordance with the cooling requirements needed to maintain a constant indoor temperature of approximately 80 deg. F. They were started and placed under thermostatic control when the indoor effective temperature reached a predetermined value, and they continued to operate until the outdoor effective temperature became equal to the indoor effective temperature, when they were stopped and the windows were opened.

Unit cooler *A*, Fig. 5, was mounted on a portable platform scale, and the ice melting and dehumidification rates were determined by direct weighing. This afforded a very convenient method of determining the cooling and dehumidifying capacities of the unit. The majority of the tests with this unit were made in the living room of the Residence in the location shown in April, and although the direct cooling was confined to the one room by closing the door leading to the hall, complete records were made of the air conditions in all of the rooms.

In addition to the air-circulating fan in the cabinet containing the extended surface cooling coil, the operation of cooling unit *B* required the running of a pump which circulated chilled water from the insulated ice tank in the basement to, and through, the cooling coil

(*Continued on page* 70)

Michigan State College Forced Warm Air Short Course

ALMOST two hundred individuals (manufacturers, their representatives, individual contractors, and engineers interested in mechanical warm air heating, air conditionng and cooling) attended the sixth annual Forced Warm Air Short Course March 29, 30, 31 and April 1 at Michigan State College, East Lansing, Michigan.

Three courses were offered—an elementary course in mechanical warm air heating, an advanced course in mechanical warm air heating and a course in residential cooling. The basis of instruction was the New Technical Code and each student was supplied with floor plans and a data sheet for a typical residence on which to apply the code. In addition to the floor plans worked out collectively, students were given a second plan to figure independently. Because of this method of procedure, it is impracticable to explain each course in detail, but at the conclusion of the publication of the new technical code in American Artisan, floor plans used in the East Lansing school will be used to illustrate use of the code.

In addition to the direct instruction, numerous valuable lectures were delivered and this report of the school will attempt to cover the principal points of the value in the lectures.

Building Construction

Bruce McLouth, of Dail Steel Products Co., speaking on the subject "Building Construction" pointed out that the engineer should understand building construction so that he will not lay out systems which can not be installed. Citing such points of construction as plates above or below studs, heading in joists at outside walls and laying joists

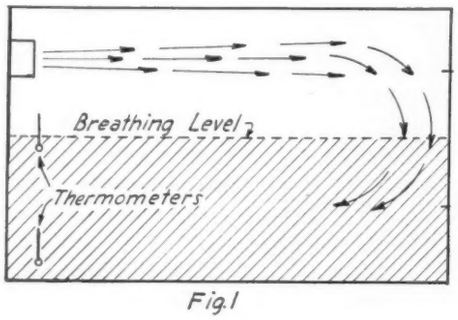

Fig. 1

across main supporting beams and some typical chimney constructions, Mr. McLouth showed on the blackboard how these features influence design and installation. He illustrated such things as methods of joining joists across main supporting beams, pointing out that lapped joist ends mean a reduction of several inches in the cross sectional area of the space through which ducts may be run above the beam. Also in some houses risers to second floor rooms alongside of chimneys may be impossible with certain types of chimney constructions, since the contractor cannot always cut as he wishes without destroying the supporting power of the structural framing. Mr. McLouth emphasized that it is oftentimes dangerous to design duct systems from architect's plans as changes in the location of soil pipes, electrical conduits, plumbing fixtures and pipe, may eliminate the using of certain spaces.

Air Movement and Control

Robert Leigh, of the Hart & Cooley Manufacturing Company, speaking on air movement and control within rooms, placed upon the blackboard several small sketches showing the results obtained with different types of registers and different register locations in the air movement and distribution throughout typical rooms.

Referring to the problem of whether or not to use high sidewall registers, Mr. Leigh drew the sketch shown in Fig. 1, showing a typical high side-wall register located above the breathing line level. Thermometers placed at the floor and at the breathing line were used to check temperatures and the general conclusions were that high sidewall registers are entirely satisfactory providing the contractor selects a suitable velocity to carry the air stream across the room

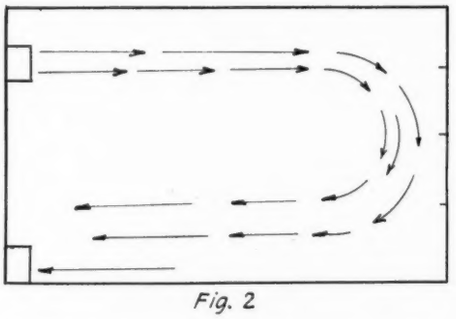

Fig. 2

to cold outside walls and either places a register at a satisfactory distance below the ceiling or uses special types of diffuser faces to prevent the air stream from "wiping" the ceiling. Another general conclusion was that in some cases the air stream may cause adequate circulation in the space between the breathing line level and the ceiling, but may leave the space between the breathing line and the floor entirely undisturbed. Such a condition results in "cold 70" with cold floors, and little if any air circulation in the occupancy zone.

Comfort in the living zone, according to the tests is dependent upon:

a. An even temperature at the breathing level.
b. An even temperature at the floor line.
c. As small a temperature difference as possible between the floor and the breathing line level.
d. No objectionable drafts, especially drafts at the floor.

High sidewall registers with baseboard returns in the same wall can supply the type of air movement shown in

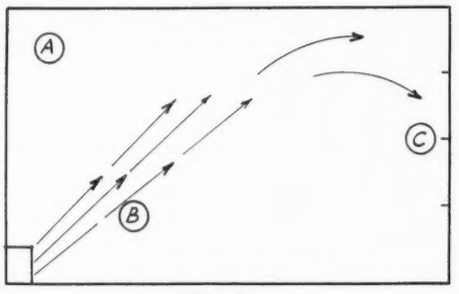

Fig. 3

Fig. 2, if air diffusion from the supply register and satisfactory velocities are maintained. The idea should be to use a velocity which will carry the air stream from the register across the upper part of the room down the cold outside wall and back across the floor to the return.

Baseboard registers, as shown in Fig. 3, without diffusers or splitter vanes in the register box usually result in the air

stream being thrown toward the ceiling at an angle of approximately 45 deg. This results in a very wide temperature differential between floor and ceiling with much too high temperatures at point A in Fig. 3, and much too high air velocities at point B in Fig. 3. This type of installation also means cold walls in many instances where the air movement is almost entirely within the area from the middle point of the room to the inside wall.

Baseboard registers with downward deflecting louvres to throw the air stream across the floor showed some interesting results as for instance with 500 ft. velocity at the register face, most of this velocity is entirely lost within three feet of the register and at a distance usually less than 12

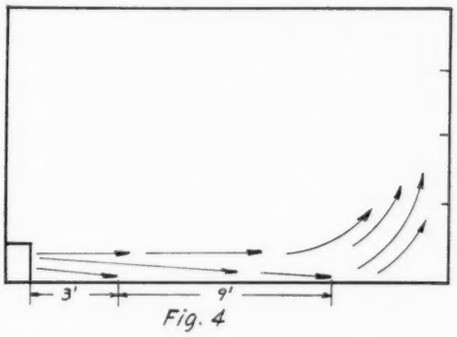

Fig. 4

feet out from the register, the air velocity is entirely dissipated and the warm air tends to rise vertically to the ceiling as shown in Fig. 4. The aim of baseboard registers with downward deflecting louvres should be to carry the air stream completely across the floor permitting the warm air to rise up the cold outside wall. This velocity must be selected carefully. Some conditions were found with this type of installation in which temperatures of approximately 85 to 90 deg. were obtained along the cold outside wall while the inside wall temperature was approximately 72 deg.

As shown in Fig. 6, the proper selection of register faces enables the contractor to control closely the air movement

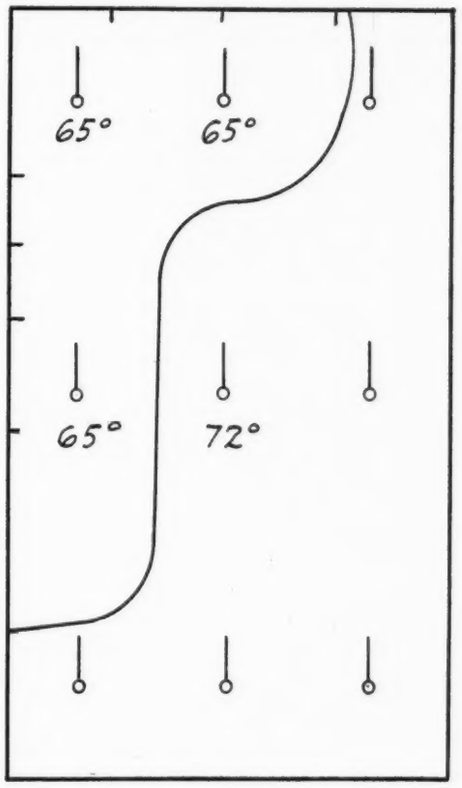

Fig. 5

within the room and registers along outside walls or along inside walls or in inside corners with correct diffusion may be satisfactory. With proper air supply to rooms and proper velocities and diffusion, Mr. Leigh stated that the tests disclosed that the location of the return seemed immaterial. Also, as a general conclusion, that for cooling operations, high sidewall registers are best as the cold air tends to settle uniformly toward the floor after issuing from the register, and that in cooling the air stream issuing from the register, due to its greater weight and density tends to hold its initial outline to a much more favorable degree than warm air which quickly dissipates its air stream. Mr. Leigh also brought out the interesting point that in cooling operations, the velocity of air from the registers should be determined exactly, as a cold air stream striking an outside wall or any other obstruction immediately creates a decided cold air draft downward from the obstruction. Also where baseboard registers are used for cooling the air should be thrown upward at as abrupt an angle as possible so that the cold air will be thrown toward the ceiling and will settle uniformly toward the floor throughout the room.

Humidity

Professor L. G. Miller of Michigan State College, speaking on "Humidity" pointed out that it takes approximately 100 Btu per hour to maintain bodily water vaporization, or to maintain a satisfactorily bodily heat loss balance and where cold walls attend the body, this rate of heat loss through evaporation is increased and accounts for the feeling of chill which occurs when persons are seated near cold walls or cold glass areas. Prof. Miller also pointed out that much of the controversy which has been raging through all heating industries relative to the saving in fuel where lower dry-bulb temperatures and higher relative

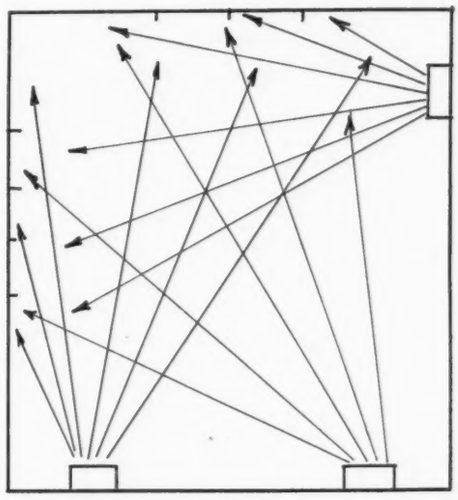
Fig. 6

humidities are maintained is not based upon actual facts because it requires 1,000 Btu to evaporate each pound of water and this amount of heat must be spent either in the furnace or in the air, therefore it may be that the small drop in dry-bulb temperature which accompanies increased percent of relative humidity may not actually show any fuel saving.

Prof. Miller pointed out that higher relative humidity has been fostered by the medical profession, but the medical profession is not in complete agreement as to the relationship between dry-bulb temperature and relative humidity and that some physicians are just as much in favor of a higher dry-bulb temperatures and lower relative humidities as are others in favor of lower dry-bulb temperatures and higher relative humidities. Prof. Miller also pointed out that there are many things in connection with humidity and

(*Continued on page* 76)

Technical Code for The Design and Installation of Mechanical Warm Air Heating Systems [Part 3]

The first part of the new code was published in March. Part 2 appeared in April. Lengthy tables, derived from factors in the ASHVE Guide, have been omitted. The full code, consisting of 36 pages, may be obtained from the National Warm Air Heating and Air Conditioning Association, Columbus, Ohio. Price 50 cents.

ARTICLE 7.

Controls

SECTION I. *Blower Controls.* An adjustable automatic furnace switch shall be placed in the bonnet of the furnace to start and stop the blower at pre-determined temperatures. Under average conditions it should be set to start the blower at from 130 to 175 deg. F., and to stop the blower at from 100 to 130 deg. F. This setting should be determined by the register temperature at which the plant is designed to operate.

SECTION II. *Summer Switch.* Unless automatically controlled, a manual switch for summer control may be placed in the hallway, stairway or other accessible location, but must not be placed where it is liable to be turned by mistake. This switch shall be so wired in conjunction with the automatic blower switch in the furnace bonnet that the blower cannot be stopped when the furnace is hot.

SECTION III. *Limit Control.* A limit control shall be wired in conjunction with any automatic temperature control, to prevent overheating of the heater unit. This control shall be set at a temperature not higher than 250 deg. F. The customary setting is not more than 30° higher than blower control setting.

SECTION IV. *Coal, Hand-Fired.* The control for a hand-fired coal heating unit shall consist of a room thermostat operating an electric motor for opening and closing the furnace dampers. The same shall incorporate limit controls. See Section 3.

SECTION V. *Coal, Stoker-Fired.* The controls for a stoker-fired heating unit shall consist of a room thermostat, limit control, a relay for operating stoker motor, and some form of hold fire control, such as high-low stack switch or time interval contactor.

SECTION VI. *Oil Fired.* Where the heating unit is oil fired, use standard controls furnished with oil burner. The same shall include room thermostat, limit controls, pyrostat or other approved ignition control.

SECTION VII. *Gas Fired.* When the heating unit is gas fired, the controls shall consist of a room thermostat, limit control, and approved safety devices to close and vent the gas line.

SECTION VIII. *Zone Controls.* The controlling of larger installations by zone controls is advisable. Such controls consist of thermostats operating dampers in warm air ducts leading to certain portions of the residence. Unless familiar with the operation of zone controls, consult representative of manufacturer of control desired.

SECTION IX. It is imperative that the owner furnish a separate circuit of proper voltage and capacity to be run from the house service to a separate panel. This panel is for the *heating equipment only.*

ARTICLE 8.

Construction Details

SECTION I. *Stacks.* Stacks shall be constructed of I. C. tin or 28 gauge galvanized iron. It is advisable to wrap all warm air stacks with one layer of 10 pound asbestos paper. All joints shall be stripped with asbestos paper. Where stack heads, boots, or other fittings, either for warm air or return air go through the first floor, all openings around such fittings shall be filled with asbestos fiber or other noncumbustible insulating materials to make this opening gas or dust tight. (Requirement of fire Underwriters.)

SECTION II. *Round Pipe Trunk Line.* Round pipe trunk line shall be constructed of galvanized iron: up to 14"—26 gauge, 18"—24 gauge, larger than 18"—22 gauge. If slip joints are used, joints shall be stripped with asbestos paper.

SECTION III. *Rectangular Duct Trunk Line.* Rectangular ducts shall be constructed of galvanized iron: up to 12" wide, use 28 gauge, to 18" wide, 26 gauge, to 30" wide, 24 gauge, and wider 22 gauge. All ducts 24" or wider shall be cross broke on top and bottom and shall have standing seams or angle iron braces. All joints shall be S and drive strips, or locked. *No Warm Air Duct, round or rectangular, shall come in contact with masonary walls.* Insulate around warm air ducts through masonary walls with not less than ½" of insulation.

SECTION IV. *Individual Round Pipes.* Individual round pipes up to 12" in diameter may be constructed of 26 gauge galvanized iron or I. X. tin.

SECTION V. *Return Air Liners.* Bottoms of all return air joist spaces shall be lined with smooth air-tight material. Capacities shall be figured at 80 per cent of round pipe equivalent.

SECTION VI. *Insulation.* Insulate all exposed warm air ducts in attic space or under unexcavated unheated sections, with not less than two layers of air cell asbestos paper or equal. In cold attic spaces more insulation is desirable.

SECTION VII. *Duct Supports.* All ducts shall be securely suspended from adjacent building member.

SECTION VIII. *Volume Dampers.* Volume dampers of locking type must be placed in each warm air run, from 6 to 12 inches from the main trunk. Splitter dampers may be necessary at any branch. Return air ducts *should* be similarly equipped and outside air inlet *must* be similarly equipped.

TABLE NO. 10

Equivalent Length of Round and Rectangular Elbows, Angles and Other Turns

To convert the dynamic loss in a *round elbow* to an *equivalent* length of pipe in feet, multiply diameter of elbow in in-

(*Continued on page* 90)

Fig. 1. Giant Ragweed Plant

Fig. 2. Giant Ragweed Plant During Pollinating Season

Air Conditioning and Its Effect on Hay Fever and Pollen Asthma*

By William H. Welker

Professor of Physiological Chemistry and Head of Department, College of Medicine, University of Illinois, Chicago.

THE number of persons in the United States suffering from hay fever has been estimated at from one to four million by different men working in the field. It is generally agreed that there has been a marked increase in the number in the last decade. This is explained on the basis of increased exposure to pollen for which automobile transportation is largely responsible.

A little over half a century ago it was first definitely shown that hay fever was caused by pollen. It required more than 25 years to establish the fact that the pollens of common and giant ragweeds are responsible for a very large percentage of the existing hay fever. Golden rod, which had received the blame of the public, is found actually to be responsible for such a small percentage of hay fever that it can be disregarded as a causative agent. Its pollen is sticky and is consequently not carried by the wind to any appreciable extent. The ragweed pollens are believed to be responsible for approximately 85 per cent of the autumnal hay fever in that portion of the United States east of the Rocky Mountains. In the Pacific and Rocky Mountain States the wormwoods are the leading causative factors. Other plants, grasses, and trees likewise give off pollens which produce somewhat similar effects but their pollenating seasons are very much shorter, and, consequently, the disturbance lasts for only a few days. The ragweed season is much longer. In the Chicago area it begins about the 15th of August and lasts until the first killing frost.

Billions of microscopic grains of pollen from the ragweed, or other plants, are dislodged from the plant and carried by the air currents. Because they are so light they may be carried for great distances through the air. There are observations showing that relatively large quantities of certain pollens have been carried as far as 35 miles, and, in a few rare instances, it has been found that they were definitely carried over 200 miles. Pollen grains have been found in the air as high as 17,000 feet above the ground. From these observations it can be seen that the air currents are quite effective in distributing the pollen over relatively large areas. The pollen grains are so small that they cannot be seen with the naked eye. (Size of pollen grains of common ragweed, 15 microns; of giant ragweed, 20 microns; one micron equals one-thousandth of a millimeter.) They are yellow in color and are re-

*Paper presented before the Conference on Air Conditioning by the University of Illinois Engineering Experiment Station, Urbana, June, 1936.

Fig. 3. Pollen Grains of Giant Ragweed Plant
(Magnified 600 diameters—with dark field illumination)

sponsible for this color as seen on the ragweed plant during the pollinating season.

The symptoms of hay fever are running nose, watery and itching eyes, and general symptoms accompanying a typical head cold. Fortunately, these symptoms appear only in those individuals who have become sensitized to the pollen proteins. Years ago by animal experimentation it was conclusively proven that the individual can be sensitized to a given protein by injection of this protein into the bloodstream, provided the protein is antigenic. If a second injection is made after an interval of a week or ten days, the animal shows symptoms that are quite characteristic. The quantity of protein required in the first, or sensitizing, injection is so small that it is almost unbelievable. As a result of these findings it seems obvious that persons reacting to pollen must have had some of the protein of the pollen enter their bloodstream. Apparently in some individuals, and perhaps under conditions where there is congestion of the lining mucous membrane, these proteins may be absorbed from the air passages and the lungs. If subsequently an appreciable amount of pollen lodges in the air passages and the lungs, sufficient protein may be absorbed to produce the symptoms characteristic of hay fever.

The only relief offered by medical treatment consists of a series of injections of pollen protein in increasing amounts two months or so before the hay fever season starts in an attempt to desensitize the individuals to pollen protein. Some allergists recommend injections over the whole year. If this treatment is successful, the individual who formerly showed symptoms of hay fever on exposure to pollen fails to show such symptoms, or shows symptoms of very much lesser degree. Not all individuals who usually suffer from hay fever respond to this treatment, and those that do respond must be treated each season because the so-called desensitization lasts only a relatively short period of time. Occasional exceptions to this rule have been noted.

For four hay fever seasons in collaboration with Dr. B. Z. Rappaport and Dr. Tell Nelson of the Department of Medicine studies have been conducted on the effect of filtration of air on the relief of symptoms in hay fever and pollen asthma. Our experiments were undertaken to see whether, by relatively simple apparatus, we could remove a sufficient portion of the pollen so as to give relief to hay fever sufferers. We used a six-bed room the first season, an eight-bed ward the second season, and an eight- and four-bed ward in the third season. One hundred and seventeen patients with hay fever of the pollen type, and with skin tests positive to ragweed pollen protein, were studied for an aggregate of 483 nights. The air was propelled from the outside into the ward by means of centrifugal blowers. This arrangement places the ward under a slight positive pressure and consequently no particular precautions had to be taken as to sealing the windows and doors. The filter material that we have found most successful is a cellulose filter (really a paper) of very loose texture, through which the air is drawn. As soon as these filters show any clogging effects from the dust that accumulates on them, they are replaced with fresh filters. These filters are inexpensive.

The amount of pollen in the air was determined by counting the number of pollen grains on definite areas of microscopic slides. These slides were coated with a thin film of vaseline, which held pollen that came in contact with it. The slides were exposed in still air (settling count) and in moving currents of air for 24 hours. During one of the hay fever seasons in our location in Chicago, the maximum was slightly below 700 pollen grains per cubic

(*Continued on page* 82)

Fig. 4. Short Ragweed Plant

YOUR STAKE IN A. S. H. & V. E. RESEARCH

An Important Message to the Heating and Air Conditioning Industries

PROGRESS in the technical field may be measured by the soundness, the completeness and the precision of the scientific data which underlies it. In your industry, the research of the American Society of Heating and Ventilating Engineers is the foundation upon which much of this progress rests.

The men of your organization depend constantly upon the proven formulae of A.S.H. & V.E. Research in their every day work. They do so with confidence that the data upon which they draw represents sound theory and practical experience, that it is authoritative and unbiased.

But that is not all. Research is never static. It must not only strive constantly to improve present knowledge, but it must also look ahead, anticipate new conditions, new applications; discover new fields for service.

Whether it be in the formulation of codes, the investigation of heat losses, the study of corrosion in piping, new forms of insulation, or the study of the physiological aspects of air conditioning, research is the great fact-finder. The time, labor and unceasing thought of many persons, the organization of many forces and the cooperative efforts of many agencies help to make this possible.

The American Society of Heating and Ventilating Engineers, through its Committee on Research, is contributing to the advancement of heating, ventilating and air conditioning in this and many other ways.

The exertion of all its resources and the expansion of its facilities are now definitely required to meet new conditions in an important period of industry expansion. You can do your share in the development of the heating, ventilating and air conditioning arts by pledging financial assistance at this time.

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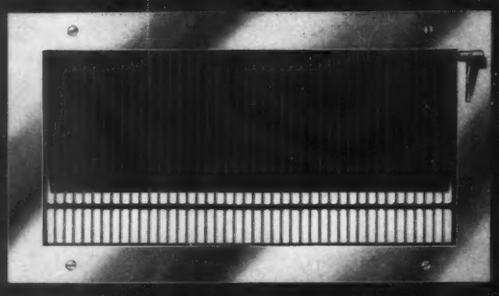
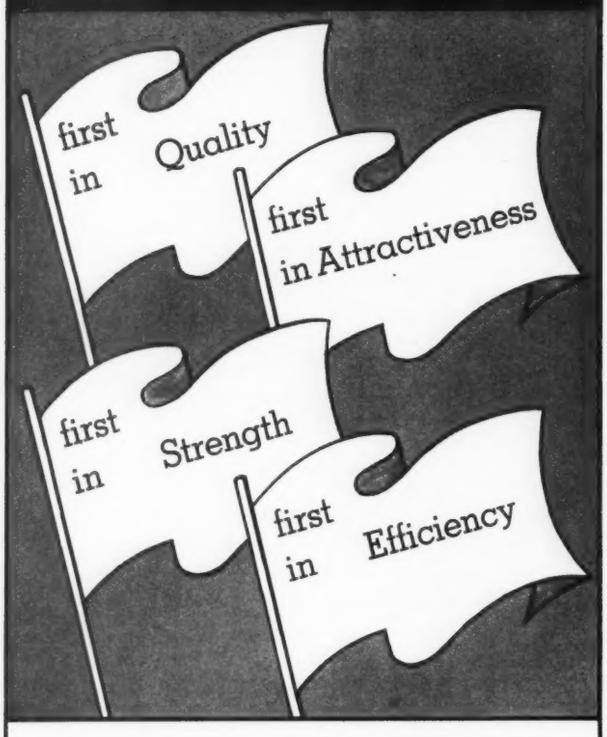
[Acknowledgment is made of the generous co-operation of the publishers in contributing this space.]

THE AIRLINE REGISTER





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Research Residence Cooling

(*Continued from page* 63)

in the cabinet located in the living room. The pump ran continuously during the periods requiring cooling. The total cooling load or heat absorbed from the air was determined by the ice meltage, and the amount of dehumidification or moisture condensed from the air was determined by collecting and weighing the water which drained from the cooling coil. During most of the tests made with this unit the door from the living room to the interconnecting hall remained open, and the unit was allowed to cool the entire first story, consisting of the living room, hall, dining room, breakfast room, and kitchen, having a total net volume of 7,300 cu. ft. Complete records were made of the air conditions in all of the rooms in the house.

It is possible to include only the most general and practical results of the tests made during the four summers. The complete results have been given in the research papers of the American Society of Heating and Ventilating Engineers previously mentioned.

Results of Tests With the Plant Using Ice for Cooling

The results indicated that, with minor changes and adjustments, a central forced air heating system could be successfully used to distribute cooled air during the summer months. By means of dampers in the ducts the distribution of cooled air was adjusted to balance the cooling load in the various rooms, and when balanced, the rooms remained uniformly cooled during the entire day and night, irrespective of the position of the sun or the change in the cooling load. The modulating damper actuated by the single thermostat located in the dining room and which served to proportion the amount of return air passing through the cooling coil in accordance with the cooling load, gave very excellent regulation of the indoor air temperature. The cool air was delivered from the registers at temperatures varying from 60 to 70 deg. F., depending upon the cooling load and at velocities varying from 50 to 450 ft. per minute. Although the cooled air was delivered to all of the rooms, except one, through baseboard registers, the average temperature difference between the floor and the ceiling was only about 3.5 deg. F. An objectionable draft was noticeable in only one room, and in that case only in the proximity of the register where the air was being delivered at a velocity of approximately 450 ft. per minute. A baffle placed in front of the register to direct the air toward the ceiling easily corrected this condition. The average rise in the temperature of the air from the fan inlet to the register faces was about 3 deg. F., and although no insulation was used on any of the duct surfaces, except the section directly surrounding the cooling coil, no condensation appeared on the ducts or furnace casing.

The chilled water entered the cooling coil at a temperature of 35 deg. F. and the mean temperature of the water in the coil varied from 39 to 44 deg. F., depending upon the cooling load. This temperature was considerably below the dewpoint temperature of the air entering the coil, and, as a result, a comparatively large

amount of moisture was condensed from the air as it passed through the coil. The largest amounts of dehumidification occurred during the first hour or two following the starting of the plant, and the rate usually decreased until, after several hours of operation, it be-

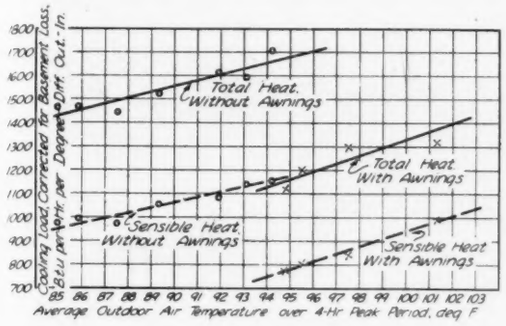

Fig. 7. Cooling load on research residence with and without awnings using ice refrigeration.

came fairly constant. Data showed decreases from as high as 9 lb. per hour to as low as 4.5 lb. per hour within two hours after cooling was started. The reduction in the indoor relative humidity to a stabilized value of about 45 per cent reduced the effective temperature from the starting condition of 75 deg. to an operating condition of 72 deg. The average dry-bulb temperature after several hours of operation was usually about 78 deg. F. The indications were that these conditions were slightly cooler than are necessary for the average residence cooling installation.

The reduction in the cooling load due to the application of awnings to all of the east, south, and west windows is shown in Fig. 7. These curves are based on the averages of data taken during the four hours of the day when the outdoor temperature was the highest. The total cooling loads with and without the awnings on the windows are represented by the solid lines, and the reduction in the load effected by the awnings was of the order of 30 per cent.

With the house closed during the day and night, and no provision made for ventilating air except that which leaked in by natural infiltration, objectionable odors were noticeable on many days.

Results of Tests Using Mechanical Refrigeration

In using outdoor air at night to cool a residence, either alone or in conjunction with artificial cooling during the day, it was considered undesirable to leave the windows on the first story open all night. For this reason the windows on the first story remained closed at all times during the summer of 1934, irrespective of whether cooling with outdoor air at night was or was not used to supplement the artificial cooling during the day.

The operating characteristics of the mechanical refrigerating plant using artificial cooling during the day and the circulation of outdoor air at night were similar to those shown in Fig 8, with the following exceptions: The beginning of the operating period was usually several hours later than 6 a. m., the time at which the windows on the second story and the attic door were closed and the duct system changed over to recirculating indoor air and ventilating air. The duration of the con-

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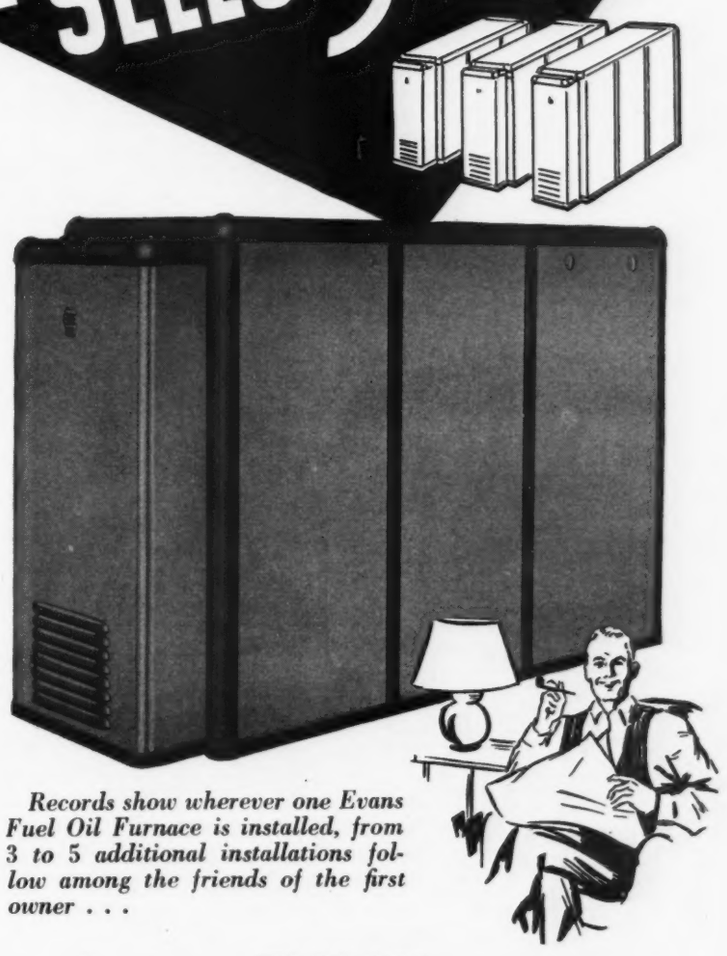

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Make money and make friends selling the Evans Fuel Oil Furnace. Made to do a special job and does a grand job of it. Lower first cost—lower operating cost. A complete package unit containing blower, filter, humidifier and exclusive patented heat exchanger. The Evans is having great success in the field. Get complete details about the Evans Oil Furnace and Winter Air Conditioner by mailing coupon.

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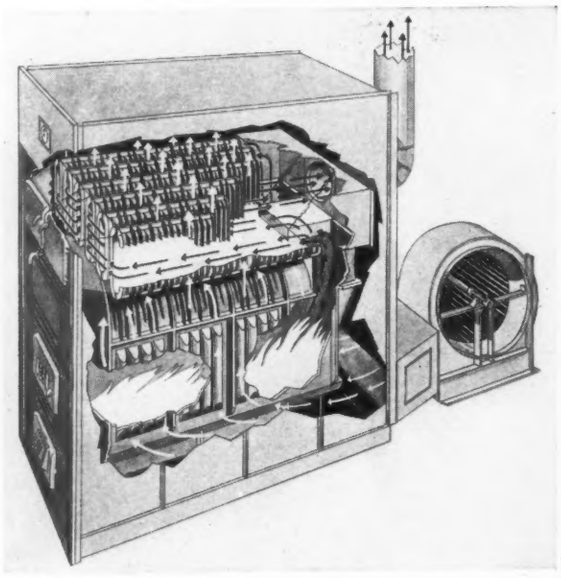
(1) The Evans has unusual and easily explained selling angles. (2) Low Price. (3) Made especially for economical heating with oil. (4) Transfers heat in 3 to 5 minutes. (5) Easy to set up. (6) Requires less service. (7) Time-tested . . . 12 years in field. (8) Compact, modern appearance. (9) Made by pioneer manufacturer that definitely stands back of the product.

WRITE TODAY! George Evans Corp. Dept. AA, Moline, Ill.
Please send complete information on the Evans Fuel Oil Furnace.
Firm Name .....
Address .....
City ..... State.....

THE GEORGE EVANS CORP. MOLINE ILLINOIS

The ACME HEATER

"It's in the Fins"



PHYSICAL DATA—LARGE SERIES

Size No.	Dimensions Length	Width	Height	Grate sq. ft.	Heat Surf. sq. ft.	Free Area sq. ft. Min.	Free Area sq. ft. Max.	Wt. Lbs.	Max. Capacity Btu.
7	6'-6"	4'-0"	7'-0"	10.31	260	6.55	10.25	5900	900,000
8	8'-1"	4'-0"	7'-0"	11.91	340	7.73	12.50	7000	1,100,000
9	9'-8"	4'-0"	7'-0"	13.06	430	8.91	14.75	8000	1,300,000
10	11'-3"	4'-0"	7'-0"	14.43	500	15.82	22.62	9300	1,500,000
JUNIOR SERIES									
2	4'-6"	3'-6"	5'-8"	3.9	136	4.7	4.7	3200	350,000
3	6'-0"	3'-6"	5'-8"	6.1	183	5.9	6.9	4800	527,000
4	7'-6"	3'-6"	5'-8"	7.2	230	7.1	9.1	5000	634,000
5	9'-0"	3'-6"	5'-8"	9.3	280	8.3	11.3	6000	800,000

Note: For Automatic Firing Add 10% to Ratings Given.

Burns Any Kind of Fuel

The design of an all cast iron, direct transmission heater, such as the Acme, is not dependent upon the kind of fuel to be used. Any type of fuel may be burned. Suitable grates may be provided so that bituminous, semi-bituminous, anthracite coal, or other solids may be used with equal efficiency. Replacement of grates and linings by proper refractory material permits the use of automatic stokers on oil burning equipment.

Large Combustion Chamber

The Acme Heater provides ample space for the ignition of gases of combustion, regardless of the kind of fuel used. The unusually large combustion chamber, acting as "primary" heating surface, effects a very efficient transfer of heat, because of the great temperature difference between the burning gases inside the chamber and the air passing over the outside surface.

Efficient Radiator Section

Although the heating surface of the combustion chamber is large and efficient, still more heat must be extracted to obtain satisfactory overall efficiency. An inspection of the "phantom view" above will reveal how the gases of combustion enter the rear smoke chamber, flow to the front of the heater, and return again to the smoke-box. It is evident that the gases are held in intimate contact with the heating surface, six times the length of the heater, before they are permitted to escape.

High Ratio of Heating Surface to Grate Area

The radiator tubes are covered with extended surfaces, or fins, typical of those used on indirect heating coils. The long, oval tubes of the radiator provide an exceptionally large heating surface and, when combined with the surface of the combustion chamber, afford a remarkably high ratio of heating surface to grate area.

Balanced Construction

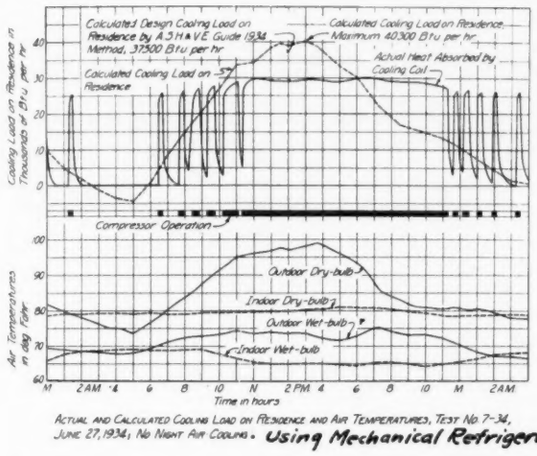
The construction of the Acme Heater provides ample free area and allows proper velocity of the air to be heated. Moreover, this air is brought into direct contact with as much heating surface as possible, resulting in the Acme of Efficiency.

ACME HEATING & VENTILATING CO., Inc.

4224 LOWE AVENUE CHICAGO, ILL.

tinuous operating period was much shorter, and the end of the intermittent operating period, when the windows and attic door were opened and the duct system was changed over to circulating night air was usually before 10:00 a. m.

Figure 8 shows the actual and calculated cooling load on the residence, and the operating characteristics of the plant during a typical 24-hour period when no cooling was done with outdoor air at night. The circulating fan continued to run the entire period, circulating indoor air and ventilating air through the duct systems. The compressor or condensing unit was under thermostatic control. At 6.30 a. m. on this particular day the indoor temperature on the second floor had risen to 80 deg. F. and the condensing unit was started through the action of the thermostat. From 6.30 a. m. the condensing unit operated intermittently until 11:20 a. m., and from then, until 11:15 p. m., the operation was continuous at full load capacity. At 11:15 p. m. the intermittent operation was resumed. The outdoor temperature was 97 deg. F. at 2:00 p. m. and it reached a maximum of 99 deg. F. at 3:45 p. m. The average indoor dry-bulb temperature varied from 79 deg. F. at 8:00 a. m., to about 81 deg. F. at 5:00 p. m., and the indoor relative humidities and effective temperatures at these times were 60 per cent and 74.5 deg., and 42 per cent and 73.5 deg. During the period of continuous operation the average indoor relative humidity was about 45 per cent, and the average indoor effective temperature was about 73.5 deg. The indications were that these conditions are conducive to comfort in the average residence cooling installation where the exposure period is of several hours duration and the degree of activity is moderate. Also, that the introduction of outdoor air equivalent to one air change for the purpose of ventilation was sufficient to prevent objectionable odors.


Calculated Design Cooling Load on Residence by A.S.H.&V.E. Guide 1934 Method, 37500 Btu per hr
Calculated Cooling Load on Residence
Maximum 40300 Btu per hr
Actual Heat Absorbed by Cooling Coil
Calculated Cooling Load on Residence
Cooling Load on Residence in Thousands of Btu per hr
Compressor Operation
Outdoor Dry-bulb
Indoor Dry-bulb
Outdoor Wet-bulb
Indoor Wet-bulb
Air Temperatures in deg. Fahr.
M 2AM 4 6 8 10 N 2PM 4 6 8 10 M 2AM
Time in hours

ACTUAL AND CALCULATED COOLING LOAD ON RESIDENCE AND AIR TEMPERATURES, TEST NO. 7-34, JUNE 27, 1934; NO NIGHT AIR COOLING. **Using Mechanical Refrigeration**

Fig. 8. Actual and calculated cooling load on residence and air temperatures test No. 7-34, June 27, 1934; no night air cooling, using mechanical refrigeration.

Again referring to Fig. 8, it may be noted that from 6:00 a. m. to 10:00 a. m. the actual average load approximated the calculated load, and that from 10:00 a. m. to 6:10 p. m. the actual load was less than the calculated load. At 6:10 p. m. the two loads became equal. The actual load never exceeded 30 500 B.t.u. per hour, while the calculated load attained a maximum of 40 300 B.t.u. per hour at 3:00 p. m. The effect of

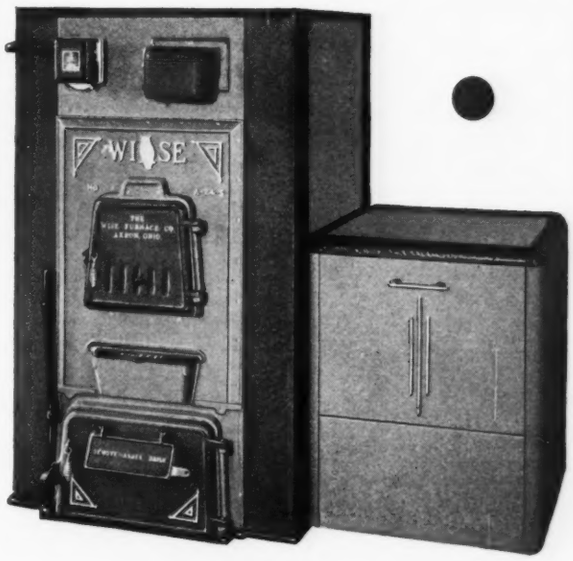
OUT of the park! The stands rise as one in wild acclaim. A Home Run! That's the new 1937 Conco Stoker line for you! Outfitted in a modish new uniform—streamlined, rich Burgundy Red in color, with Chromium trim. Conco's batting average was high last year, and it's come through spring training with refinements. This is going to be a great year for stoker sales. Join a pennant-winning team and be in the money this fall! Conco is going to pitch out some fine sales promotion. Sales manuals, colorful printed literature, newspaper advertising, and other promotion to help you dig up prospects and make sales. You're up at bat. Make it a Homer! Lam it over the fence this year with the Conco Stoker line!

There are still a number of territories open. We will be glad to go over our proposition with dealers who are active and who can qualify for representation. Write us.

CONCO-SAMPSEL STOKER CORP.
DIVISION OF H. D. CONKEY & COMPANY
702 Carlson Ave., Mendota, Ill.

A full range of sizes—a model for every stoker requirement.

AIR CONDITIONING
... at its best!



Complete winter air conditioning is now available with the new WISE line of air conditioning furnaces. They are available for coal or gas as illustrated and can be had in either cast iron or steel.

Cash in on air conditioning . . . and do it in the proper manner. Install WISE units on every job. Write us today for literature.

WISE FURNACE CO.
AKRON OHIO

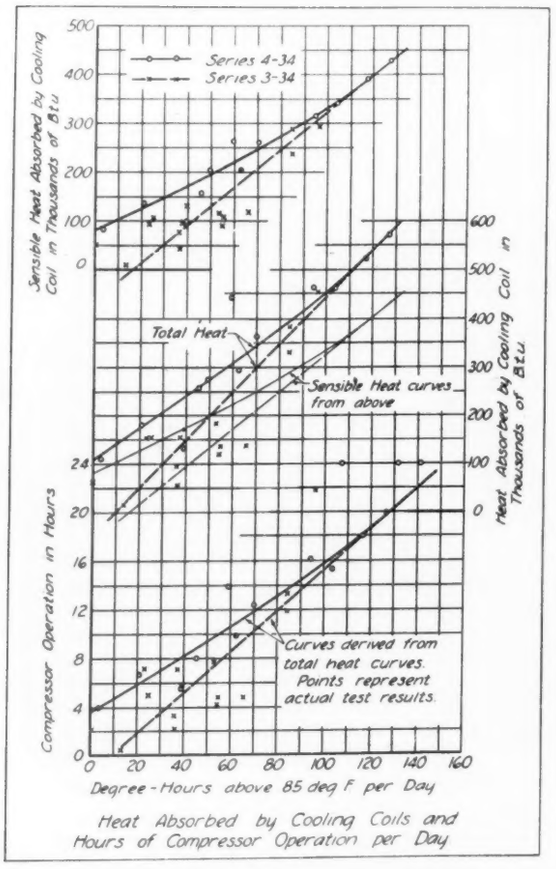

Series 4-34
Series 3-34
Total Heat
Sensible Heat curves from above
Curves derived from total heat curves. Points represent actual test results.
Sensible Heat Absorbed by Cooling Coil in Thousands of B.t.u.
Heat Absorbed by Cooling Coil in Thousands of B.t.u.
Compressor Operation in Hours
Degree-Hours above 85 deg F per Day
Heat Absorbed by Cooling Coils and Hours of Compressor Operation per Day

Fig. 9. Heat absorbed by cooling coils and hours of compressor operation per day.

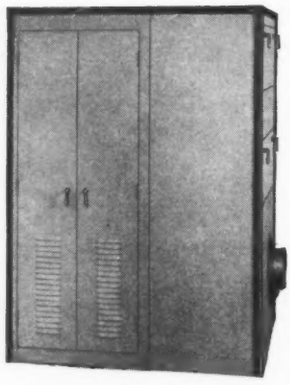
the heat lag and the heat storage capacity of the structure is best shown in the period from 6:10 p. m. to 11:15 p. m. During this period the condensing unit continued to operate at approximately full capacity, althought the calculated load had decreased rapidly, until at 11:15 p. m. it was less than one-half of the capacity of the unit.

Figure 9 shows the relationship between the degree-hours above 85 deg. F. per day, the hours of compressor operation, and the total and sensible heat absorbed by the cooling coil. The number of degree-hours per day above 85 deg. F. is an index of the severity of the day, and is calculated by taking into consideration the number of hours during the day that the outside temperature is above 85 deg. F., and the number of degrees by which the average temperature during this period exceeds 85 deg. F. For example, if on a given day the outside temperature is 90 deg. F. for 6 hours during the day, and during all the remainder of the time it is below 85 deg. F., then the number of degree-hours for that day is the product of 6 and 5, or 30. The base temperature of 85 deg. F. was chosen because it was found that usually no cooling was required unless the outside temperature was 85 deg. F. or above. The degree-hour in cooling is somewhat analogous to the degree-day in heating, and it affords a means of comparing the severity of days and seasons from the standpoint of the probable amount of cooling that would have been required.

The two lower curves in Fig. 9 indicate the amount

(*Continued on page* 80)

ANNOUNCING THE
NEW HESS CLIMATE MASTER
FOR WINTER AIR CONDITIONING



The new Hess Climate Master is modern and complete, including a heavy, welded steel inner body or heat transfer unit, centrifugal blower, air filters, humidifier, and the Hess Automatic Oil Burner with controls.

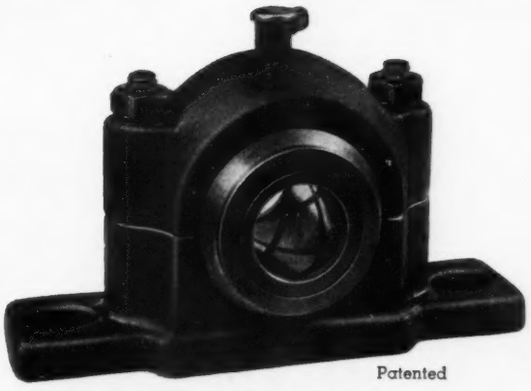
The outer casing has an attractive, red, baked enamel finish with black trim and rounded corners. The climate Master is very compact with many refinements and high efficiency of operation. It comes in three sizes with deliveries up to 250000 B.t.u. per hour.

THE COMPLETE HESS LINE ALSO INCLUDES

Hess Welded Steel Furnaces . . . for any fuel, wide range of sizes.
Benefactor Furnaces . . . a high quality welded steel furnace, at low price.
Hess Blower Filter Units and Air Conditioners.
Hess Automatic Coal Stoker furnaces.

Write today for dealer portfolio of entire Hess line.
EXCLUSIVE TERRITORY SELLING PLAN GIVES GREAT ADVANTAGES

HESS WARMING & VENTILATING CO.
FOUNDED 1873 1211 S. WESTERN AVE. CHICAGO, ILL



Patented

RANDALL D. R. O. R. PILLOW BLOCK

BETTER SERVICE with *Randall* BEARINGS

The Randall D.R.O.R. (double reservoir oil return) precision bored pillow blocks are rapidly becoming standard equipment in the air conditioning field. With a minimum of attention, they will operate practically a life time. They are self-aligning, self-lubricating, require little attention and operate with minimum running torque.

Cut-away section of ball of D. R. O. R. and Flange Type Pillow Block showing Double Reservoir Oil Return feature.

Since the introduction of the D.R.O.R. sales have nearly doubled monthly.

Blowers equipped with Randall Bearings deliver air throughout the system WITHOUT METALLIC BEARING NOISE. Write for our new Pillow Block catalog or outline any special bearing problems you have.

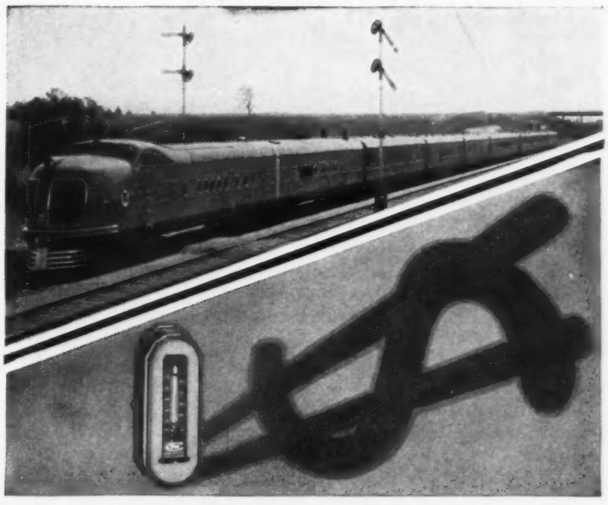
RANDALL FLANGE-MOUNT PILLOW BLOCK

Randall Flange D.R.O.R. Pillow Blocks can be easily mounted or incorporated in the design of cabinet type air conditioning equipment.

Randall GRAPHITE PRODUCTS CORP.
Dept. 511 609 W. Lake St., Chicago, Ill.

CONTROLS
Speed New Streamliners

Streamliner City of Denver, Chicago and North Western Ry.-Union Pacific R. R.



COOK CONTROLS
Speed Your Profits

As up to the minute as the new streamliners—and as efficient—Cook No. 12 Heat Control and the No. 218 System give your customers the finest possible automatic control of their forced air and gravity heating plants.

Cook Controls are simple to install, easy to handle and service-free in operation. That's why hundreds of furnace men sell Cook Controls. Another reason—there's a good profit in every sale.

These are two good reasons for you to write today for detailed information about Cook Controls and the Cook Sales Plan.

COOK

COOK CONTROLS

THERMOSTATS—FURNACE LIMIT CONTROLS
ZONE CONTROLS—BLOWER CONTROLS

COOK ELECTRIC CO.
2675 Southport Ave. CHICAGO

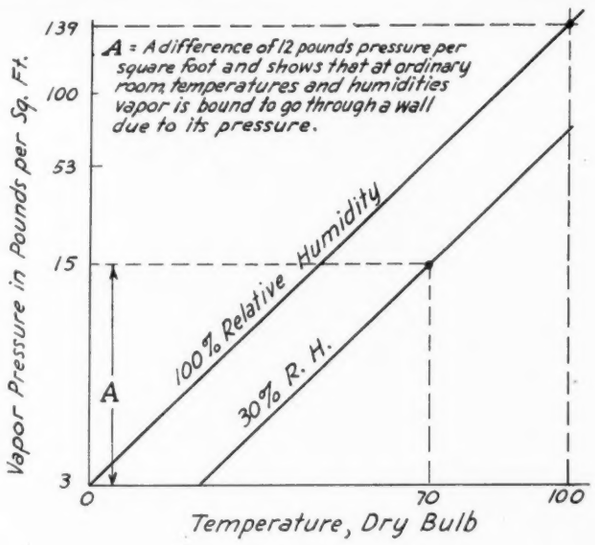
Warm Air Short Course

(*Continued from page 65*)

its effect on bodily comfort that we do not know, and that as a general rule it may be said that the whole heating industry is overselling the advantages of relative humidity and is paying too little attention to the fact that many structures can not possibly maintain the percentage of relative humidity which physicians have been recommending and which the industry is selling. He explained that air is a mechanical gas mixture and that each element acts independent of the other elements present.

Prof. Miller placed on the blackboard the abbreviated chart shown, which compares dry-bulb temperature or molecular velocity with the amount of moisture in pounds per sq. ft. or vapor pressure and using two temperatures, namely 70 deg. and 100 deg. dry bulb, the chart shows that at 30 per cent relative humidity and 70 deg. dry bulb temperatures there is a vapor pressure of approximately 12 pounds per sq. ft. His reason for showing this chart was to explain that the insulating industry must shortly take cognizance of the effect of this vapor pressure which obtains at comparatively low relative humidities and low dry-bulb temperature and that this pressure of approximately 12 pounds per square foot accounts for the fact that vapor as moisture in air will penetrate practically any material. Prof. Miller declared that in laboratory tests, vapor pressures have passed moisture through ¼-inch of tire tube rubber almost instantaneously and that vapor introduced at one point in a house registers practically instantaneously at any other points within the structure.

One problem which the insulating contractors must face is the fact that this vapor pressure "pushes" the vapor into outside walls and may fill the interstices of the insulating material with moisture which freezes or condenses in the insulation. This vapor may eventually work itself through to the outside surfaces of the wall taking paint with it and in some cases may so fill the insulation as to practically nullify all insulating effect.


139
100
53
15
3
A = A difference of 12 pounds pressure per square foot and shows that at ordinary room temperatures and humidities vapor is bound to go through a wall due to its pressure.
Vapor Pressure in Pounds per Sq. Ft.
100% Relative Humidity
30% R. H.
A
0
70
100
Temperature, Dry Bulb

Automatic Controls

C. W. Nessel of Minneapolis-Honeywell Regulator Company, speaking on "Automatic Controls," explained some of the basic principles of thermostatic construction and explained that a two-degree thermostatic variation permits an 8 to 10-degree room temperature variation and because of this variation the manufacturers developed the heat anticipating or heat accelerating thermostat. The

A Burner for Every HEATING NEED
BETTER ENGINEERED, BETTER BUILT!
Here are the burners that leading furnace and air-conditioning manufacturers are using. The simplest and most efficient oil burners built—"it's all in the design." Performance records prove lowest operating cost. Standard, interchangeable parts give it unequalled adaptability that manufacturers need. Easiest servicing ever—and least of it.
PET OIL BURNER
Removal of one screw gives easy access to electrical assembly. Low first cost—amazing economy. Fewer parts—standard parts, means fewer, less expensive repairs.
HEAT-PAK COMPACT OIL BURNER
The burner that introduced "compact" to the industry. Ideal for oil-fired units . . . can be adapted to any made. Flange or pedestal mounting—or both, to eliminate vibration. Simple—economical—efficient.
WORLD'S LARGEST BUILDER
ALDRICH COMPANY
PEORIA, ILLINOIS
OF GUN TYPE OIL BURNERS
Interchangeable BLAST TUBES
flanges cast in any position.
3½" 5"
9"
Unequalled Adaptability
Illustrations above show interchangeable blast tubes on which flanges may be cast in any position. For pedestal mounted burners, blast tubes of any desired length are furnished.
This feature "custom-fits" burner to any thickness of combustion chamber wall, yet fits it into smallest space in furnace casing.

PLACE YOUR CHIEF RELIANCE ON THE REPUTATION OF THE MANUFACTURER

YOUR MERCHANDISING ABILITY WILL MAKE

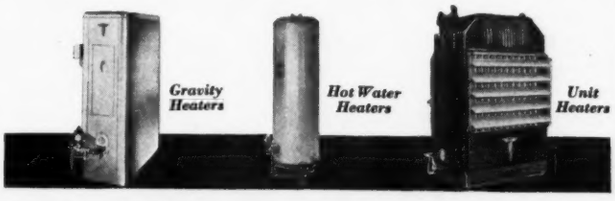
MOST MONEY FOR YOU

SELLING *Janitrol* GAS-FIRED WINTER AIR CONDITIONING

● You know the great demand for winter air conditioning. You know the present trend toward gas heat. Put your merchandising ability behind the right equipment and make more money.

Gas, with its cleanliness and flexible control has top acceptance everywhere as the only fuel that gives fully automatic service. National advertising is daily building a vast acceptance for Janitrol as the ideal winter air-conditioning equipment... engineered to modern standards, specifically for gas.

Its simple, mature design assures easy installation, long dependable operation, lasting customer satisfaction. Numerous exclusive Janitrol features make sales easy. Janitrol engineering cooperation simplifies drafting of installation plans. Janitrol puts the greatest merchandising and sales training program ever seen in the gas heat field behind your sales efforts. Write for full details. Surface Combustion Corporation, 2377 Dorr St., Toledo.



Janitrol

GAS-FIRED WINTER AIR CONDITIONERS

A COMPLETE LINE OF GAS HEATING AND WINTER AIR-CONDITIONING EQUIPMENT FOR EVERY RESIDENTIAL AND COMMERCIAL REQUIREMENT.

CONSTANT IMPROVEMENT

by WAGNER

has resulted in

Quieter Air Conditioner Motors

WAGNER has furnished motors for air conditioning equipment for many years and has continuously improved motors for this purpose. Among the outstanding features of Wagner motors are: (1) QUIET OPERATION, (2) special operating characteristics to meet this exacting service, (3) long life, and (4) attractive appearance. As a result of Wagner's many years of experience in building motors for air conditioning equipment, Wagner motors are leaders in this field.

A few of the points of superiority of Wagner squirrel-cage motors are:

1. Rotor is of the cast-aluminum type, with bars, end-rings and blowers cast integrally, effecting a one-piece rotor exceptionally sturdy and long-lived. Skewed closed rotor slots minimize magnetic pulsations across the air gap and produce uniform starting torque at different positions of the rotor.

2. The frame and end-plates are strong and rigid, and accurately machined—assuring permanent alignment of bearings and uniform air gap, two essentials for quiet operation.

3. Blowers furnished on both ends of the rotor and many large openings in the stator frame insure thoro and unrestricted ventilation.

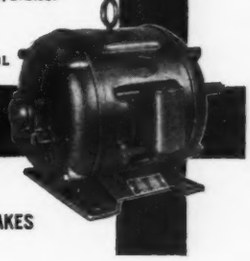
4. Stator windings are given a superior winding treatment which provides an insulating surface that is oil and moisture resisting and can be easily cleaned.

5. Stator and rotor laminations are punched from annealed, non-aging, high-grade electric sheet-steel selected for its magnetic properties.

Many other features of Wagner motors are worth investigating. Write today for Bulletin 182 which describes the Wagner motors that are Second-to-None for air conditioning.

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, U.S.A.



MOTORS • TRANSFORMERS • FANS • BRAKES

basic principle of this thermostat is the introduction of artificial heat to the thermostatc element, which, therefore, anticipates changes in room air temperature and starts or stops the firing device just a little while before the room temperature calls for a change in operation. Mr. Nessel recommended that on all gravity furnace systems, there should be a thermostat with a damper motor to operate the draft and check or with the thermostat connected to the automatic firing device. Also every gravity system should have a limit control to prevent the fire from getting out of hand.

With regard to mechanical heating systems, Mr. Nessel declared that in high heat loss buildings where there is a steel furnace, it is satisfactory for the fan to run from bonnet temperatures. On the other hand in insulated houses with cast iron furnaces, a heat anticipating thermostat and a limit control must be used in order to compensate for the heat storage capacity of the heavy castings. The speaker suggested that all damper motors on coal fired jobs should have check switches which will shut the draft, open the check and start the fan in case of any electrical current failure. On mechanical heating systems using light steel furnaces with the fan and burner controlled by the thermostat, operation will be satisfactory, whereas with heavy cast iron furnaces this method of hook-up may not be so satisfactory. Combination control of blower and burner has not proved entirely satisfactory for stoker firing where large amounts of heat are generated and may be stored in the furnace so some method for dissipating this heat or shutting off the stoker before the thermostat is satisfied must be employed. Mr. Nessel declared that variable speed systems are satisfactory chiefly because they prevent stratification and insure continuous ventilation.

Calculating Fuel Costs

Edward Anderson, instructor at Michigan State College, speaking on "Figuring the Season's Fuel Costs" placed a chart on the blackboard showing the degree days per month for Lansing and explained how with different types of fuel these degree-days may be interpreted in terms of amount of fuel required month by month. Mr. Anderson declared that certain tests on equipment deficiencies indicate that soft coal in hand-fired systems seldom show more than 55 to 45 percent overall efficiency. Stokers show 55 to 70 percent efficiency; oil-fired units from 50 to 65 percent efficiency; gas-fired units from 70 to 76 percent efficiency and hand-fired coke from 55 to 70 percent efficiency. Mr. Anderson interpreted these efficiency ratings as indicating most furnaces operate with too high a stack temperature and do not have sufficient prime heating surfaces for all fuels.

Residential Cooling

F. H. Downs of Clarage Fan Company, speaking on "Residential Cooling," gathered together all the loose ends of the cooling discussion and plans figured by the class in cooling and summarized the different methods of handling cooling in various types of structures. He pointed out that cooling is not a new art; neither is air conditioning since air-conditioning installations were made prior to 1900 and industrial air conditioning has been practiced for many years. Because cooling has been accepted by the public as meaning air conditioning, one of the principal tasks of the industry is to emphasize that winter air conditioning is just as important if not more so, than summer air conditioning.

Many of the present practices in summer cooling have grown up without much thought to ultimate consequences as for instance the maintenance of a level 72 deg. dry-bulb temperature in public places, irrespective of outside temperatures. A more satisfactory operation will maintain a set temperature differential. An interesting development connected with cooling is the handling of relative humidity and many satisfactory jobs have been installed where dry air much warmer than was first thought desirable has re-

Write Now for

Sales Bulletins, Complete Prices, Illustrated Installation Sheets, Operation Costs and why a *Blower — not a fan,*

The New 1937
Lau "NITEAIR" Blower
for Summer Cooling

A new Attic Blower with almost unlimited sales possibilities . . . every home owner a prospect. Top floor apartments, business buildings, beer gardens, cafes, etc., are additional fields for the Lau "NITEAIR" Blower. Don't wait! Write now for complete information.

The Lau Blower Company
DAYTON, OHIO

THE NEWEST THING IS 24-HOUR AIR CONDITIONING

On-and-off service is out-of-date!

● Here is a method of air conditioning you should know all about—a complete oil burning winter air conditioning system that casts aside the old idea of intermittent operation of burner and blower.

Perfection Stove Company engineers working in field and factory have perfected a method of synchronized "High-low" burner and "High-low" blower operation that gives the purchaser what he really wants—continuous air conditioning service through every minute of the twenty-four hours, not just the average eight.

A NEW MODEL FOR POPULAR-PRICED HOMES

A powerful interest is being shown in our new model Superfex No. 100-E which has an output of 65,000 B. T. U.'s. This model is shipped assembled and will pass through a standard doorway. It sells at a price that puts truly modern air conditioning squarely into the popular-priced home market.

Send for complete information immediately—a complete catalog presents a story of this newest development in Winter Air Conditioning—continuous, 24-hour service, and gives specifications and all necessary data. Learn all about it. It is rapidly becoming "the talk of the industry."

PERFECTION STOVE COMPANY
7858-C Platt Avenue • Cleveland, Ohio

The Mark of Quality

SUPERFEX

Complete Automatic Oil Burning Heating Plant that conditions air

A HEXCEL ROOM COOLER WILL...

ROUND OUT YOUR AIR CONDITIONING LINE!

Be prepared for that summer "Room Cooling" Business with the Hexcel Line. For now is the time that people are starting to think of cool comfort during hot summer days . . . now is the time they will start looking. With Hexcel supplementing your regular line you will be able to give them whatever type of installation they desire . . . you will be ready for this business. Hexcel's attractive appearance is a decided sales feature . . . its simplicity of installation and efficient economical operation mean savings and satisfied customers. Hexcel is built right for lasting service, and is priced within the reach of every purse. There is a good profit in each Hexcel sale for you. Write today for complete information . . . for literature . . . for discounts. Use the coupon.

List Price **$79.95**

SPECIFICATIONS

Height . . . 54½"
Width . . . 18¾"
Dia. of Base . . . 17¾"
Weight . . . 80 lb.
Finish . . . Brown cracklelacquer with chromium trimming.
Motor . . . Signal A.C. 115 Volt two speed drawing 47 watts.
Fan . . . 12" dia. . . . 4 blades.
Air Delivery . . . High Speed 335 cu. ft. low . . . 280 cu. ft.
Water Flow . . . regulated from 0 to 140 gal. per hour.
Model "AA" Room Cooler having 16" fan, larger in size and with a 40% greater efficiency than model illustrated can be furnished for $124.50.

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Please send at once complete information and prices on Hexcel Room Coolers.

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sulted in satisfactory working conditions.

Mr. Downs declared that he believed cooling will gain widest acceptance in commerce to be followed later by residential cooling, and that cost of cooling is still a problem. Contributing methods of cooling, such as attic ventilation or night air cooling, use of ventilation or insulation in houses and adequate use of awnings, etc., all tend to reduce the time during which mechanical cooling is necessary. Mr. Downs suggested that the intelligent contractor will do well to watch cooling activities and familiarize himself with the cooling practice and necessary engineering, in order that he will be in a position to do cooling work whenever cooling assumes the volume which the industry anticipates.

◆

Research Residence Cooling

(*Continued from page 74*)

of saving in compressor operation that may be effected by supplementing artificial cooling during the day with cooling with outdoor air at night, as provided in the Research Residence, where only the second-story windows and attic were opened and 9.5 air changes per hour were provided with the fan in the forced-air system. For the season of 1934 the indications were that a saving of 20 per cent in the time of plant operation was possible by this method of ventilation. However, it should be kept in mind that in determining the net financial saving the cost of operating the ventilating fan should be taken into consideration.

[To be continued]

Patterns for A. C. Fittings

(*Continued from page 61*)

where *FD* is parallel to *AE* and *HE* is parallel to *CD*.

Note in this problem that both ends of the offset are of similar dimensions, *A-B-C* forming a right angle, bringing the corner *B* in a perpendicular or horizontal position, depending on which way the offset is placed. The side view of the offset is shown by *J-K-L-M*. In the front view *A-B-H-E* is a section on the line *KL* in side view and *B-C-D-F* a section on the line *JM*. As the top *BC* and the left side *BA* in front view are flat, then the side view shown by *J-K-L-M* becomes the pattern for these two sides, by simply reversing the pattern and placing *L* over *M* and *M* over *L* on the line *ML*. The projections between the two reversed sections in front view are shown by *FA* and *HC*, and is indicated by the slant line *LM* in side view.

Take this distance *LM* and set it off on the line $L^{\circ}M^{\circ}$ at the right. From these two points drop perpendicular lines, making $M^{\circ}M^{x}$ and $L^{\circ}L^{x}$ equal respectively to *AE* and *FD* in front view. Draw a line from M^{x} to L^{x}, which completes the pattern for *E-A-F-D* and *D-C-H-E* in front view. This pattern $M^{\circ}L^{\circ}M^{x}L^{x}$ can be reversed, placing L^{x} over M^{x} and M^{x} over L^{x} on the line $M^{x}L^{x}$.

When the offset is of a small size the entire pattern can be made in one piece without waste and with but one double seamed or Pittsburgh corner.

New PEERLESS CLEANAIRE BLOWER

★ READY TO INSTALL ★ COMPLETELY ACCESSIBLE ★ QUIET IN OPERATION
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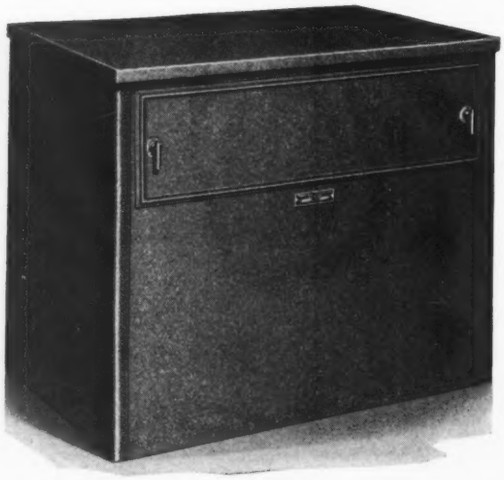

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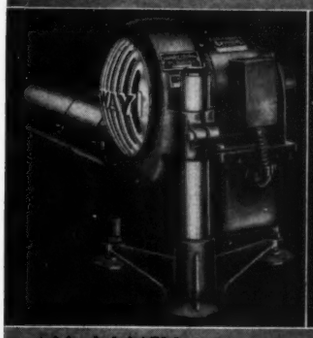
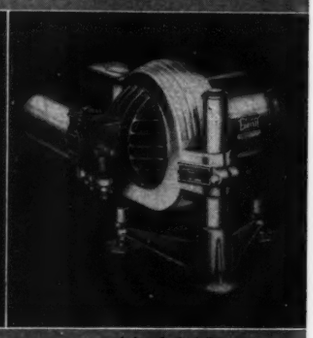
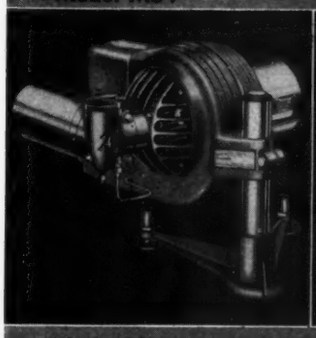


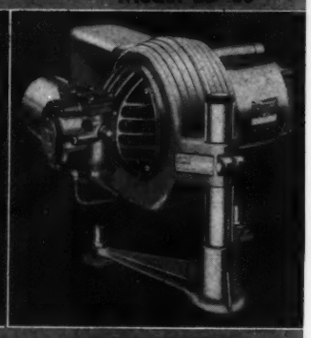
Model MSV



Model LD 25



Model LD 25



Model LD 55

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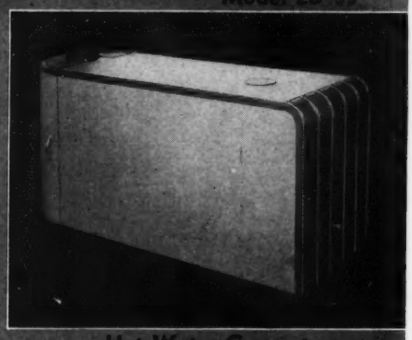

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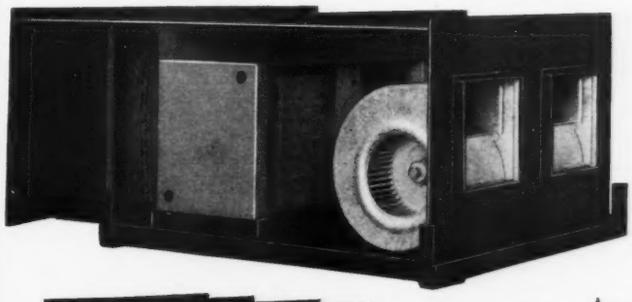

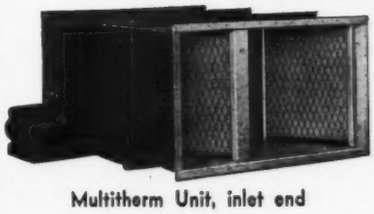

Multitherm Unit, inlet end

Above: Multitherm Unit, outlet end, with side of casing removed showing fans, coil and filters. Aside from renewing filter packs as necessary and oiling fan and motor bearings occasionally, NO ATTENTION required summer or winter.

. . for Stores, Restaurants, Theatres, Offices, Factory, etc.

These expertly designed units—Clarage Multitherms—are the RIGHT answer to a great many conditioning problems, from a simple cooling job to a complete air conditioning installation.

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AND MULTITHERMS ARE SPACE-SAVERS—very compact! Installation is easy; building alterations few. Units can be suspended from the ceiling, or installed on the floor. Operation can be made entirely automatic.

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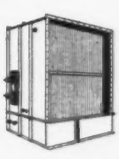

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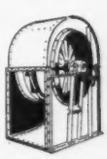

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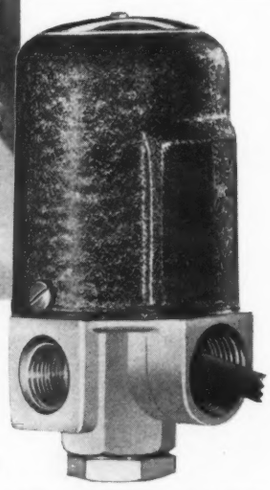

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CONTROL FOR AIR-CONDITIONING

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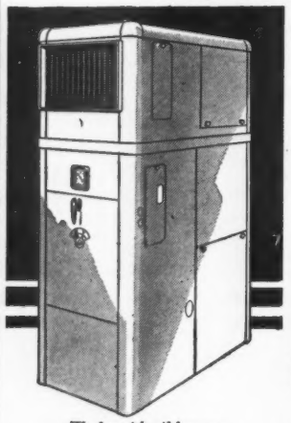

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This efficient unit *cleans, tempers,* and *humidifies* the air and constantly *circulates* it through the rooms. Entire unit, including burner, may be concealed beneath a compact, beautifully-finished jacket. Fits perfectly in any basement.

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Hay Fever and Pollen Asthma

(*Continued from page 68*)

yard as determined by the settling counts. By comparing the pollen counts outdoors and in the ward we found that we could remove between 98 and 99 per cent of the pollen. This is sufficient removal to make practically all the hay fever sufferers comfortable. To attain such high efficiency it was found necessary to have the air pass through the filters at slow speed; this means that the filter areas have to be relatively large. Mechanical vibration has to be eliminated from the filters, since this produces a sifting effect and has a tendency to permit pollen to go through. This is accomplished by making flexible connections between the blower and the filter forms.

Hay Fever Leads to Asthma

In the air from which practically all the pollen had been removed, most of the hay fever sufferers were relieved completely, or almost completely, of all their symptoms in from one-half to one-and-a-half hours. Freedom from these symptoms continued as long as they remained in the pollen-free air. On their return to pollen-laden air, either outdoors, or even in the hospital corridors the symptoms rapidly reappeared. Our experiments showed that personal efficiency could be increased by providing filtered air in the sleeping quarters of hay fever sufferers. Under these conditions they secured a good night's sleep, which was not usually the case if they were exposed during the night.

Individuals who have suffered from hay fever for a number of seasons may develop asthma for which the pollen is solely responsible. The number of hay fever sufferers in which asthma ultimately develops has been given by various authorities as ranging from 15 to 40 per cent.

Pollen asthma is a more serious disturbance, accompanied by changes in the lungs, and, therefore, requires longer confinement in filtered air before the relief from symptoms is obtained. Forty-seven pollen asthma patients were studied in this work. Our patients required from a day-and-a-half to four, or even five, days continuous confinement before the symptoms disappeared, and in a few of the cases relief from symptoms was not obtained even then. For some of them the relief was profound. They were unable to sleep in pollen-laden air unless they could do so sitting up in a chair. In the pollen-free room they could get normal sleep.

The results in these experiments show definitely that when pollen is excluded from the environment of individuals suffering from hay fever, or pollen asthma, their symptoms disappear, and they remain free from symptoms as long as they are not again exposed to pollen-laden atmosphere.

We feel that our findings can be utilized in the treatment of hay fever and pollen asthma in the home and elsewhere, in the form of an apparatus which will deliver into the room sufficient air for

Send for this NEW AUER Register Book!

THE latest AUER Register Book, just issued, is a complete presentation of the AUER Line for warm air heating and air conditioning. You will find this Book of genuine value in the selection of Registers, Cold Air Faces, and Grilles (including, of course, air directional registers.) The durability, efficiency, and beauty of AUER products need no comment. This illustrated Catalog is a handy reference book for *all* styles, with sizes and prices.

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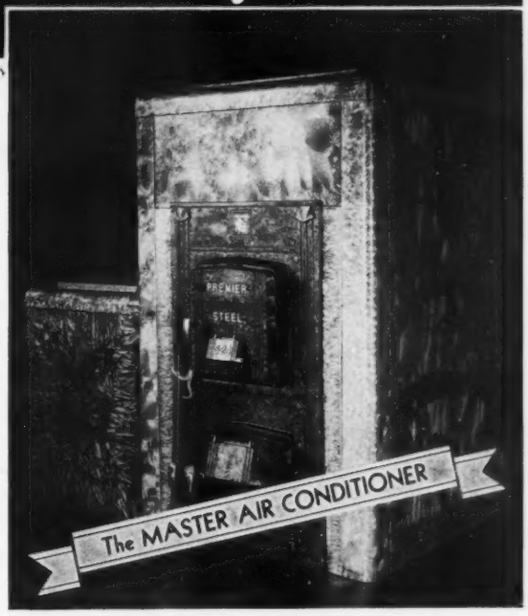

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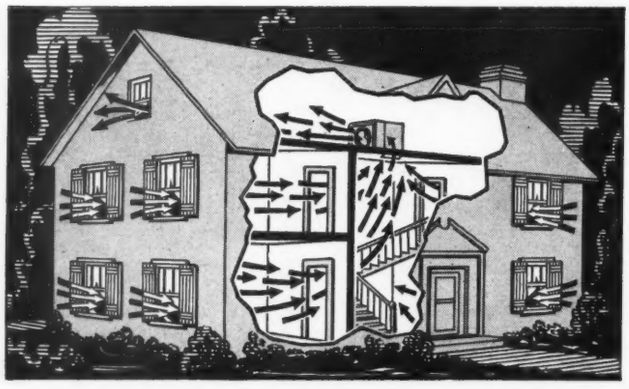

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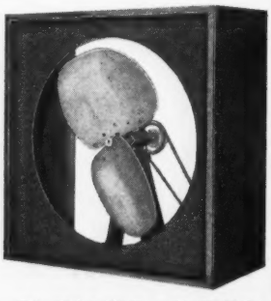

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the occupant and at the same time carry it through filter material that will effectively remove the pollen. It would be applicable as well to hotels, factories, schools, stores, and places for public assemblies. In fact, there are at the present time certain stores and public buildings equipped with filters of the same type as we have been using in our experiments that have been discovered by the public to give marked relief to hay fever sufferers. These buildings have become literally hay fever resorts. The removal of pollen in these buildings is not, of course, as complete as we have obtained in our experiments here in the Illinois Research and Educational Hospitals because of the less perfect

Fig. 5. Short Ragweed Plant During Pollinating Season

design of the filters. There are two private homes in the State of Illinois that are completely equipped for filtration of the air for the removal of pollen which have given very definite relief to the hay fever sufferers in these homes. The question of the efficiency of the pollen removal necessary to give relief is dependent very largely upon the degree of sensitivity of the hay fever patient. If the sensitivity is great, high efficiency is essential; if the sensitivity is of low grade type, less efficient filters will give relief.

We have studied the effect of air cooling without removal of any of the water from the air. This results in a higher degree of saturation of the air with water. In our experiments with a 10 degree cooling below the temperature in the rest of the hospital, we had an average increase of 10 per cent in the relative humidity. Our hay fever and pollen asthmatics were definitely less comfortable in this cooler room, with the increased percentage saturation of water, than they were in rooms with higher

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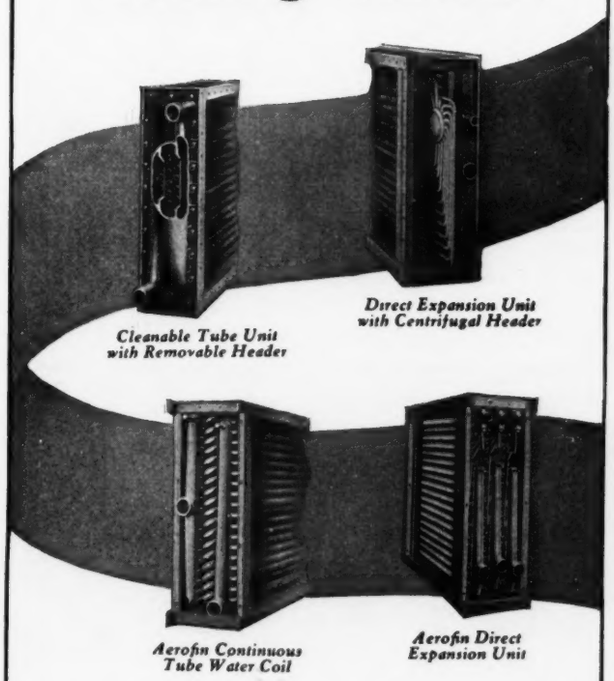

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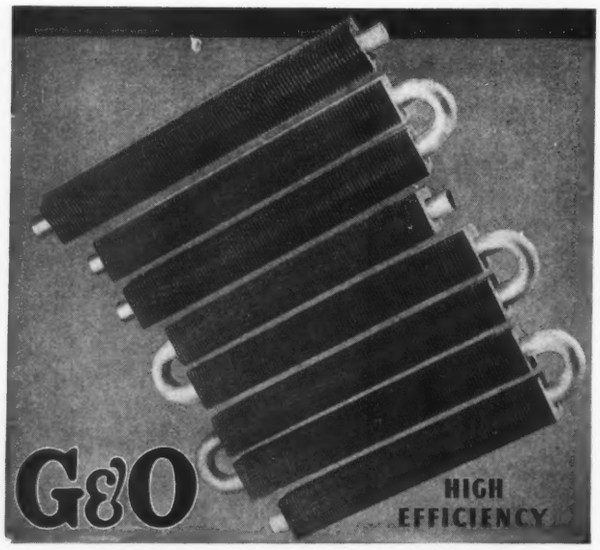

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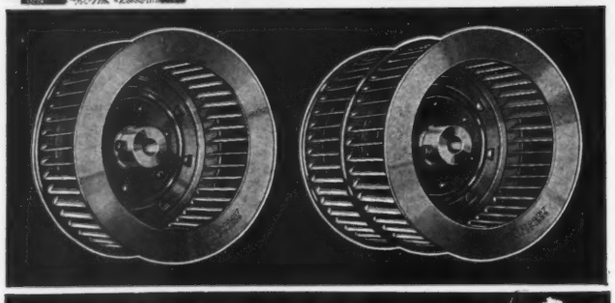
Pioneer Manufacturers of Individual Square Fin Tubing in the United States

These Blower Wheels will improve your product



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Write for catalog with ratings for all sizes and data for housing scroll design.

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temperature but lower percentage of water saturation.

Effect of Low Humidity

We also studied the effect of the air with low relative humidity on a series of pollen asthmatics. This ward with eight beds was run at around 30 per cent relative humidity and a temperature of 79-80 deg. F. This condition seems to be slightly more favorable for pollen asthmatics than a room that had a higher relative humidity. This study was conducted because it was observed in the ward where the humidity was not controlled that after a heavy thunder storm all of the patients had asthmatic seizures. In this practically pollen-free air the disturbance could not be attributed to pollen. In the following hay fever season an experiment was conducted to see whether these seizures would occur where the relative humidity was maintained at a constant point. It was found that they do occur, but the onset is delayed, the attacks are possibly not as severe, and recovery seems to be somewhat more rapid. However, it is quite clear from the results of these experiments that the prime reason for the asthmatic seizures is not the marked increase in the relative humidity, which occurs as a rule during heavy thundershowers. Since ozone is an accompaniment of heavy electrical storms, we introduced ozone into the air of the ward in quantities larger than occur during electrical storms without producing any effects whatever. We have also made preliminary experiments on the effect of negative ionization of the air with no effect whatever on the patients in the ward. We feel that these experiments should be repeated using very much higher concentrations of negative ions. The reason for the onset of asthmatic seizures in a pollen-free atmosphere under these conditions remains undetermined.

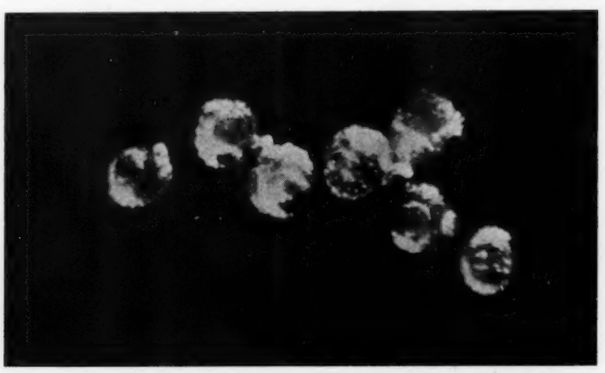

Fig. 6. Pollen Grains of Short Ragweed Plant
(Magnified 600 diameters—with dark field illumination)

From our results it is apparent that the important factor in air conditioning, so far as relief of symptoms in hay fever and pollen asthma is concerned, is the filtration of the air in such fashion that the major portion of the pollen is removed. Additional

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● There's year-'round profitable business in installing ventilating fans. Summer and winter, air must be moved for health protection and greater working efficiency.

You can guarantee your customers that the exclusive design of Peerless Multiblade fans insures quiet operation with large air capacities and low power consumption. Motors are fully enclosed to exclude dirt and moisture. Single and three speed fans for restaurants, offices, factories and similar buildings.

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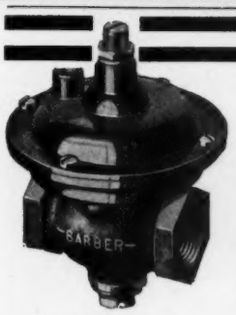
THE PEERLESS ELECTRIC CO.
WARREN, OHIO



Made in ¼", ⅜", ½", ¾", 1", 1¼", 1½", and 2" sizes.

Be Sure It's a

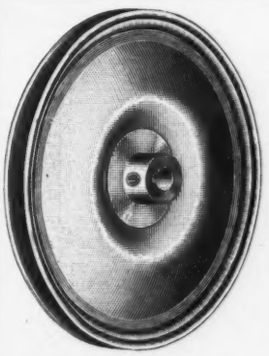
BARBER Gas Pressure REGULATOR

There is no such thing as a "pretty good" Gas Pressure Regulator. A device so important must work within narrow limits and work infallibly. Barber Regulators are built to exact standards of precision, rigidly inspected, and *gas-tested for operation within three-tenths pressure drop.* Neat and compact design, all-bronze bodies, a quality product in every detail. A. G. A. approved, of course. Yet Barber Regulators are moderately priced!

Write for complete literature, prices and discounts on the entire line of Conversion Burners, Appliance Burners, Controls and Regulators.

THE BARBER GAS BURNER CO.
3704 Superior Avenue • Cleveland, Ohio

The Barber Gas Burner Company of Michigan
4475 Cass Avenue, Detroit, Michigan



Manufacturers of
AIR CONDITIONING UNITS, STOKERS AND BLOWERS
are getting
PEAK EFFICIENCY WITH

MAUREY Steel V-Pulleys

Designed and built to stand up under the severest use in all kinds of Air Conditioning Units, Blowers and Stokers.

Made and carried in stock for both "A" and "B" section belts in a wide variety of sizes. These pulleys have heavy rolled edges and are made with solid steel or malleable iron hubs. **No die cast hubs are used in MAUREY PULLEYS.**

(Not Die Cast)

The MAUREY Variable Pitch Diameter Pulley

Made of SOLID STEEL—new construction. Permits a speed variation of as much as 30%. In four sizes, 3¼" to 4½" O. D.

MAUREY MANUFACTURING CORP.
Wabash at 29th **Chicago, Ill.**

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GRILLES and REGISTERS
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ENGINEERED
AIR DISTRIBUTION

Do you use the best? UNI-FLO Grilles and Registers have been selected for many prominent heating, cooling, ventilating, and air conditioning installations because of exclusive construction and engineering features which give superior results. Get acquainted with UNI-FLO! Write for catalog and full information.

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BARBER-COLMAN COMPANY
ROCKFORD, ILLINOIS

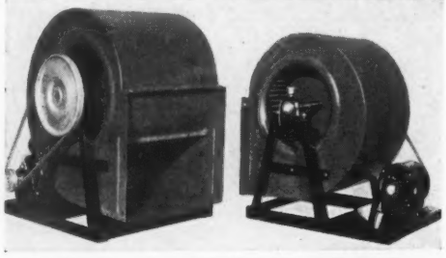
PICTURE
OF A MAN

who is making money hand-over-fist selling the new Skuttle Direct-Fired Humidifier . . . the industry's first practical solution to the problem of humidifying radiator-heated homes. If you have not yet written for complete information on this new money-maker, do so today! It's 1937's hottest news in the home humidification field. Address your request for descriptive literature to:

THE J. L. SKUTTLE COMPANY
4290 W. Fort Street, Detroit, Michigan

Skuttle
AUTOMATIC HUMIDIFIERS

★ ★ ★ ARTCRAFT ★ ★ ★
HEAVY DUTY DOMESTIC BLOWERS



SILENT ● SERVICE PROOF
CHICAGO STEEL FURNACE CO., write BLOWER DIVISION
7934 So. Chicago Ave. Chicago, Illinois

CHAMBERLIN
AUTOMATIC HUMIDIFIER
DEPENDABLE—PROFITABLE

FITS ANY FURNACE—
ONE PIECE CASTING
VALVE FREE FROM LIMING

Here's a fully automatic trouble-free humidifier cast entirely in one piece. Valve completely out of water. Trap cast integral reduces liming. Quickly installed. Manufactured over 10 years. Write for literature and prices.

CHANDLER COMPANY
CEDAR RAPIDS, IOWA

comfort can be secured by cooling with dehydration.

If air filtration for the removal of pollen is to be used for the relief of symptoms in hay fever, or pollen asthma, it is desirable that a member of the medical profession be called to diagnose the case. Such air conditioning is ineffectual in other conditions. It is desirable, therefore, to be certain that pollen is the causative factor in cases where air filtration is to be utilized as the relief measure.

A number of manufacturers are marketing pieces of apparatus that can be connected to the window of a room by which the air is drawn in from the window and filtered through filter material. Any such machine that does a satisfactory job of removing practically all the pollen and supplying a sufficient volume of air will be capable of giving relief to hay fever and pollen asthma sufferers. Houses equipped with hot-air heating plants, and particularly those with forced circulation, can be equipped with filters for the removal of pollen with a minimum of expense.

Apparatus Requisites

In purchasing an air filtration machine, there are certain points that can be determined by direct observation. First, the area of the filter material ought to be relatively large. This will insure the flow of air through the filter material at a low speed, which is essential if a high degree of efficiency is to be maintained. Second, there should be no appreciable vibration in the apparatus; should this occur, there is a danger of shaking the pollen through the filters. Third, the volume of air delivered by the machine for a given unit of time must be sufficient to keep the individual comfortable. The Laboratory of the Council on Physical Therapy of the American Medical Association in Chicago has studied the efficiency of most of the air filtration machines for the relief of hay fever, and the public can secure information on this point by contacting that organization.

Our work suggests the possibility that efficient air filtration with recirculation and filtration may be applicable to allergic manifestations connected with other antigenic dusts. The dust from feathers, from animal hair, and cotton produces definite sensitivity in some individuals and results in symptoms ranging from eczema to asthma. House dust is also known to produce definite allergic disturbances that are not referable to any of the known proteins. Recently one case of sensitivity to building material has been observed. It would seem entirely reasonable to suppose that, with efficient filtration of the air, the concentrations of these environmental dusts could be reduced so that there would be little danger of producing sensitivities in individuals not previously sensitized, and so that they would probably produce no allergic manifestations in those already sensitized.

Grateful acknowledgment for assistance in our work is made to the American Air Filter Company of Louisville, Ky., the Peoples' Gas Light and Coke Company of Chicago, and the General Electric Company.

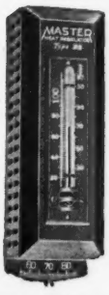
Twenty years of experience in making heat regulating equipment are back of every

MASTER HEAT REGULATOR

Whether your customer belongs to the upper 400, or lives on Main Street, there is a Master Regulator that will satisfy him in quality and price, and pay you a satisfactory profit—for example

TYPE B-22 **$13.50**

for only — (to Dealer)

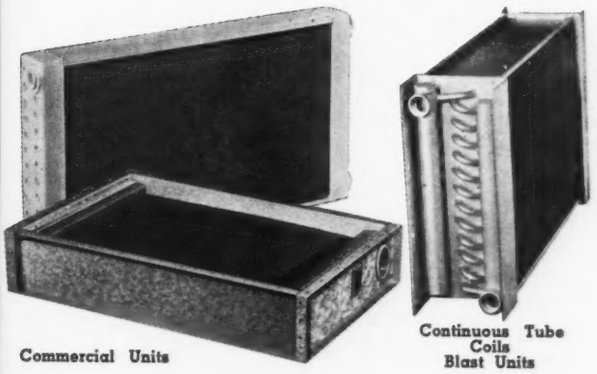


Silent, accurate, listed as Standard by Underwriters Laboratories. Just right for your biggest market — the moderate salaried home owner.

Write for details TODAY

WHITE MANUFACTURING CO.
2362 University Ave., St. Paul Minnesota

young COILS FOR HEATING-COOLING-AIR CONDITIONING



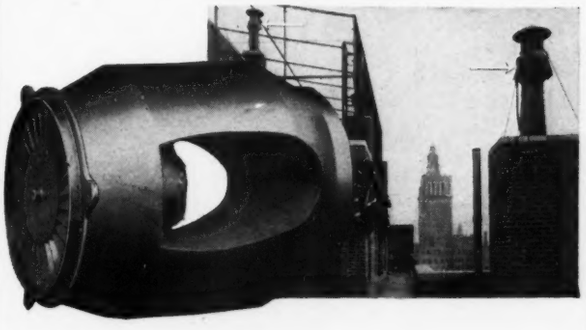
Commercial Units — Continuous Tube Coils Blast Units

Engineers and Heating Contractors can select a heat transfer surface from the Young line to meet exact specifications for any heating, cooling, or air conditioning job. Each coil has been scientifically designed, properly made and its performance tested under actual operating conditions. If you do not have Young catalogs on heat transfer surfaces—write for them immediately.

Offices in all principal cities.

YOUNG RADIATOR COMPANY
RACINE, WISCONSIN
Young Quality

DE BOTHEZAT BIFURCATOR



To provide a simple way of making smoky fireplaces draw and improving the drafts of installations subject to poor draft conditions—install a De Bothezat Bifurcator. It is especially recommended where corrosive fumes or hot gases, injurious to motors, are to be removed. The motor in this unit is entirely isolated from the airstream. The Bifurcator can be used horizontally or vertically whether in exhaust duct, in the chimney, or on top of it. Available in sizes from 8" to 30". Write for descriptive bulletin.

DE BOTHEZAT DIVISION
American Machine and Metals, Inc.
100 Sixth Avenue New York, N. Y.

PULLEYS

DESIGNED FOR AIR CONDITIONING

For "A" and "B" Belts

A complete stock of all sizes for "A" and "B" belts from 1½" O. D. to 14" O. D. which lists from 42c and up.

Ideal where quiet operation and true running at all speeds is essential.

Let us show you how we are saving hundreds of manufacturers thousands of dollars annually.

Variable Pulley

Ideal for air-conditioning units where a speed variation up to 30 per cent is desired. Four sizes are available—3¼", 3½", 4", and 4½"—list price $3.00 to $3.75. Save up to 50 per cent on this pulley.

CONGRESS TOOL & DIE COMPANY
9034 Lumpkin Avenue
DETROIT, MICHIGAN, U. S. A.

Technical Code

(*Continued from page 66*)

ches by *number of diameters* offering equal *resistance* from table 10a and divide by 12 inches. Add equivalent lengths of all elbows and turns to the *actual* length of straight pipe in feet to obtain the total equivalent length from the *furnace* to the register.

Table 10a

Radius of Inside Throat in per cent of Rd. Pipe Diam.	0	¼	½	¾	1	1¼	1½
Diameter of Round Pipe Offering Equal Resistance	38	18.5	13	10	8.5	8	7.5

To convert the dynamic loss in a *rectangular* elbow to *equivalent length of duct in feet,* multiply *width of elbow* in inches on the side making the turn by number of widths offering equal resistance, (see Table 10b) and divide by 12 inches. Add equivalent lengths of all elbows and turns to actual length of straight pipe in feet to obtain the *total equivalent length* from *furnace* to register.

Table 10b

Radius of Inside Throat in per cent of pipe Width	0	¼	½	¾	1	1¼	1½
Resistance	47.5	16.5	9	6	5	4.5	4
Widths of Rectangular Pipe Offering Equal							

45 degree angles offer approximately half the resistance of 90 degree elbows. Side wall and baseboard register boxes offer approximately half the resistance of a square throat elbow.

[The End]

Revolution in Business

(*Continued from page 32*)

And to the manufacturer of these appliances and devices, we say that your sales efforts will be met with greater success if you will use good judgment in your sales approach to the small business man, taking care to see that he gets off on the right foot and that he fully recognizes and appreciates the many possible chances for failure unless he conforms to a well charted course of procedure. You know his success or failure will most certainly be reflected in your own profit and loss statement.

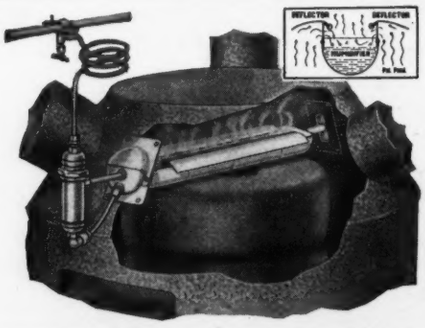
One of the most important steps in a new and untried venture is the keeping of good records. Know your cost of doing business, and don't be misled by the belief that a commission of $200.00 on a single sale means a profit. An overhead of $500.00 per month requires two and one-half sales, each yielding a gross commission of $200.00. Plain, simple arithmetic, but only too often one forgets that a gross profit of a substantial amount on a single sale does not necessarily result in a profitable business venture. There must be sufficient of these sales to meet the overhead and leave a profit if there is to be a profit. Don't incur that overhead unless and until you are satisfied that you can cover it with the gross profit obtainable through sales you can actually make. There's no profit in a sale you should have made, or may make in the future.

10 TIMES MORE EFFICIENT

Genuine Bronze Pan is 10 times more efficient in heat transmission than cast or sheet iron. Patented wings carry air directly across surface of water. Highly efficient for gravity or forced-air systems. Made in single and double units with Water-Boy Automatic Water feeder.

ZEPHYR HUMIDIFIER

Installed without removing furnace hood. Adjustable overflow and adjustable front hood plate. Twin unit uses but one water feeder.



Write today for copy of new catalogue A-5, showing complete line of humidifying devices, water feeders, low water cutouts, air vents, etc.

MAID-O'-MIST, Inc.
180 N. Wacker Drive, Chicago, Ill.

INDEPENDENT "Fabrikated" REG U.S. PAT. OFF.

adjustable
DIRECTED AIR FLOW
REGISTERS *and* GRILLES

SEND FOR CATALOGS

THE INDEPENDENT REGISTER CO.
3741 E. 93rd ST., CLEVELAND, OHIO

With the Manufacturers . . .

Trane Builds Addition

The Trane Company, LaCrosse, Wisconsin, is about to build an addition to its factory at Second and Cameron avenues.

◆

Firetender-Arco Stoker Unit

Holcomb & Hoke Mfg. Co., 1525 Van Buren St., Indianapolis, Indiana, and American Radiator Co., New York City, are producing jointly the Firetender-Arco, a stoker-boiler unit. A 4-page folder is being distributed giving complete description.

◆

Dail Has New Administration Building

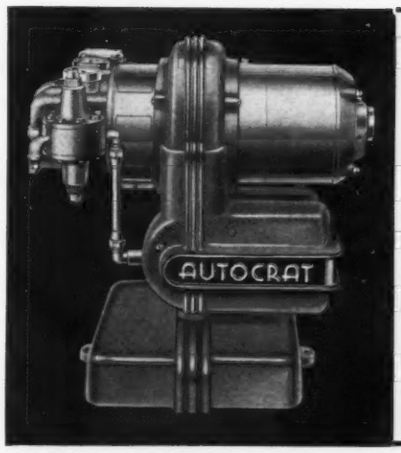
Dail Steel Products Company, Lansing, Michigan, formally opened its new administration building on February 22. Into this building has been built a living example of year-round air conditioning. B. F. McLouth, chief engineer at Dailaire, designed the building and heating system. The Dailaire system is the first to be built under the new technical code adopted by the National Warm Air Heating and Air Conditioning Association.

The building has a cubical content of about 33,000 cubic feet, with a 210,000 Btu heat loss, and is equipped with a No. 14B2WYGG Dailaire unit. Cooling will be accomplished by deep-well water taken from the city mains at approximately 55 deg. temperature, and passed through the coils, after which it will be piped to the roof for spray cooling, thence to a storage tank, and from there to a lawn sprinkling system. The cooling load is estimated at six tons refrigeration.

Temperature is completely controlled both in summer and winter. Humidity is governed in winter by means of a humidistat operating a solenoid which controls the water sprays in the washer chambers. Dehumidification, in the extent allowable by the 55 deg. water is also regulated by a humidistat.

The building is of cinder block construction. A column of glass brick marks the building entrance.

One room was especially designed for holding schools to instruct dealers in the fundamental engineering of air conditioning and the fine points of the Dailaire equipment.



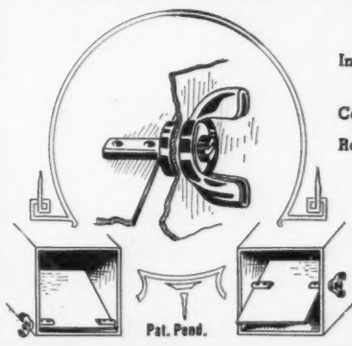
SATISFIED??

If not, then write today for Catalog B-1 and learn why it will pay you to switch *now* to AUTOCRAT—the oil burner that *stays sold.*

●

AUTOCRAT
OIL BURNER CORP.
Cedar Rapids, Iowa

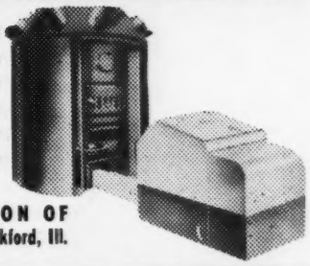
GOESE TIME SAVER
DAMPER CONTROL



Positive—Simplified
●
Less Labor to Install
Insures Tight Vibration-less Job
●
Can be Used on either Flat, Square or Round Pipes
Regular or Splitter Dampers
●
Screw Slot on Threaded Stud Shows Position of Damper.
Finished in Cadmium.
Write for literature.

Goese Mfg. Co.
2548 N. 18th Street
Milwaukee, Wis.

ECONOCOL



Join the nation's fastest growing industry by lining up with ECONOCOL. It's the leader in *performance, low upkeep, appearance,* and *value.* Write today for details on profitable, exclusive dealer franchise.

ECONOCOL STOKER DIVISION OF COTTA TRANSMISSION CORP., Rockford, Ill.

STOKERS

Faster Evaporation is combined with Measured Evaporation when you install

THERMO-DRIP

● D-r-i-p . . . DRIP . . . DRIP. Down the drip spout water trickles directly to the broad, warmed surface of the THERMO-DRIP Vapor Pan. And at peak bonnet temperatures, when the rate of drip is accelerated, the pan contains scarcely more than a sheath of water. Definitely, this means *faster* evaporation. To this, THERMO-DRIP adds another advantage—the one home owners want most of all—MEASURED evaporation! No more water is admitted to the pan than the heated air is capable of holding. Write for full details.

AUTOMATIC HUMIDIFIER CO.
18th and Main Streets CEDAR FALLS, IOWA

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 116.

168—Janitrol Engineering Handbook

Surface Combustion Corporation, Toledo, Ohio, is distributing to all engineering handbook readers several new pages for the Janitrol Sales Engineering Handbook. These are corrections and the old pages should be taken out of the book and replaced by these.

◆

169—Artcraft A-C Units

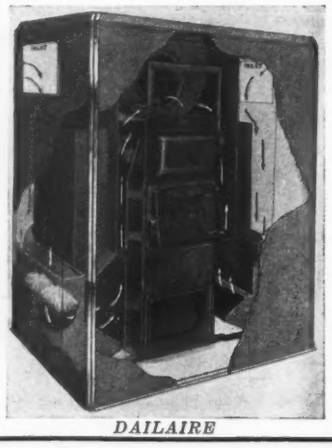
Chicago Steel Furnace Co., 7934 South Chicago Avenue, Chicago, Ill., is distributing a 4-page folder describing the Artcraft oil-fired modified air-conditioning units. Inner casings are designed for temporary heating purposes, thus eliminating any possibility of scratching and marring the beautifully finished outer cabinet during building construction.

There are four models ranging from 75,000 to 175,000 Btu. capacity.

◆

170—Fan Data

National Association of Fan Manufacturers, General Motors Building, Detroit, has available for distribution to architects, engineers, contractors and other interested persons, a leaflet which illustrates and describes standard methods of designating discharge and rotation for centrifugal fans as well as arrangement of drive. The information has been conveniently classified and may be inserted in a standard three ring binder for ready reference.



DAILAIRE

OUR PAST *will build* YOUR FUTURE

The Dailaire organization pioneered air-conditioning. The cornerstone to its success and wide public acceptance is based on one factor . . . SOUND ENGINEERING.

The Dailaire system is not only engineered at the factory but its dealers learn proper installation from the practical training received at the Dailaire school of engineering. Proper installation is the backbone of modern air conditioning. Mr. Dealer, such cooperation means a lot to your future. Pride of ownership has sold many Dailaires.

Write us today and get the facts about the Dailaire franchise.

DAIL STEEL PRODUCTS CO.

1050 MAIN ST. LANSING, MICH.

HERE'S THE ANSWER

. . . to your summer SALES problem!

Electric Valves for Gas—Water—Oil Humidistats

SELL SUPREME! There's the answer to the sales problems. No need to let this summer slip by and just sit back waiting for business to pick up. GO OUT AND GET IT. You'll be surprised at the number of prospects who will turn into buyers when you show them the advantages of an early humidifier installation.

The Supreme Humidifier offers effective and controlled humidity in warm air furnaces.

Write today for more details.

SUPREME ELECTRIC PRODUCTS CORP.
103 Mt. Hope Ave., Rochester, N. Y.

THE ERIE AUTOMATIC STACK DAMPER

ERIE type automatic stack dampers are closed by gravity when fan or blower is not running, prevent down drafts coming into the building and preserve the fan or blower from deterioration caused by rain and snow.

The heavy steel-round frame is equipped with louver bumpers for silent operation, and strengthened across the diameter with a center section that prevents the louvers from staying open when the fan or blower is not in use.

ELGO SHUTTER & MANUFACTURING CO.
634 West Warren Avenue, Detroit, Michigan

AN ALL PURPOSE AIR VELOCITY METER

ALNOR VELOMETER

Instantaneous-Direct Reading
No Timing
No Calculations

Write for Folder

ILLINOIS TESTING LABORATORIES, INC.
412 No. La Salle St. Chicago, Illinois

Air Conditioning

—What happens between two rooms, one having a six minute air change, and the adjoining room a twelve minute air change?

—Can you install a thermostat control system properly?

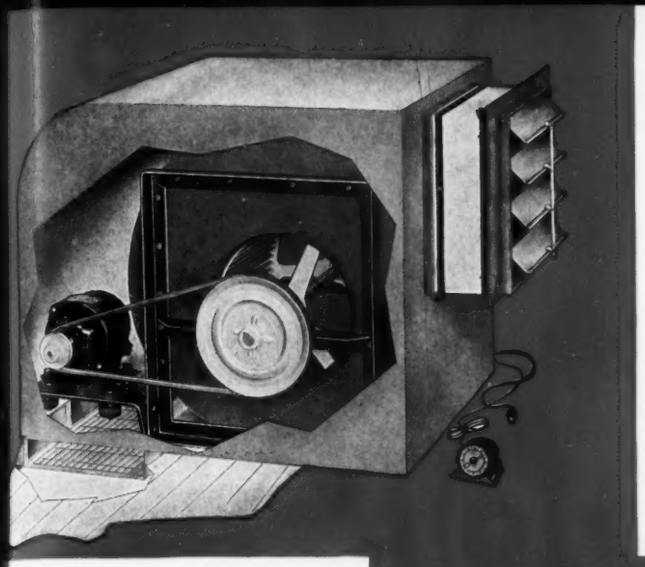
The answers to these and hundreds of other mechanical questions about air conditioning are appearing in the monthly *Air Conditioning Section* of AMERICAN ARTISAN.

If you do not now get the ARTISAN, send us $2 and we will enter your subscription for a full year—12 consecutive issues. Your subscription will yield a rich harvest of money making ideas and solutions to many mechanical problems connected with warm air heating and sheet metal contracting.

AMERICAN ARTISAN
6 North Michigan Ave. Chicago, Ill.

Right now

IS THE TIME TO SELL *Your Customer* A NEW SUMMER ATMOSPHERE

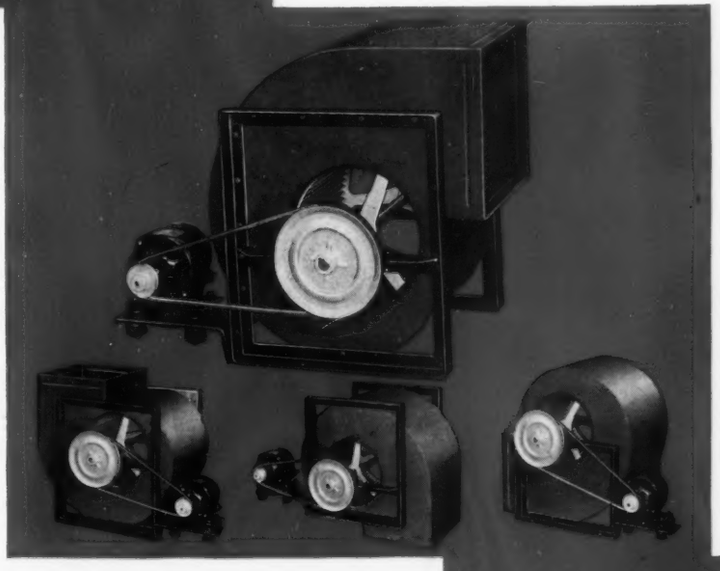


Sell them HY-DUTY HOME VENTILATION

A NEW MODEL—FIRST TIME ANNOUNCED

Compact — Attractive — Accessible — All moving parts shielded. Automatic in operation — turns on or off any time desired, by low voltage time clock control — self-opening and closing outlet shutters. Quiet.

Priced for the Average Home



HY-DUTY BLOWER WHEELS AND SELF-ALIGNING, SELF-OILING PILLOW BLOCKS also offered in separate equipment.

HY-DUTY BLOWERS FO HOME VENTILATION . .

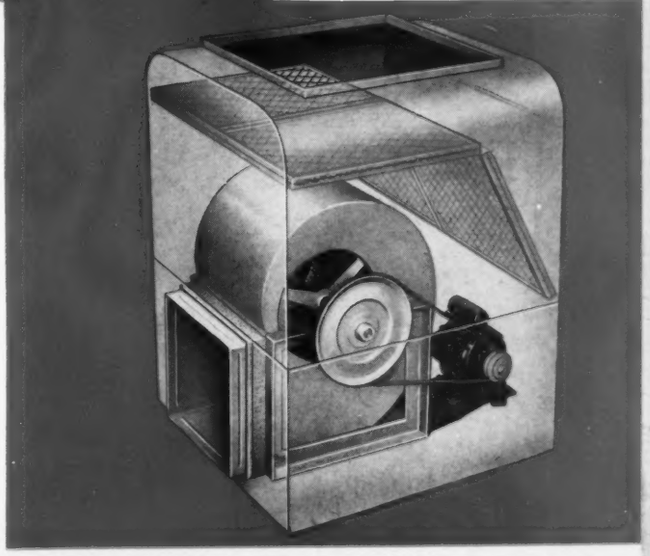
offered separately or with con plete equipment—low voltag time clock control, ceilin grill, automatic outlet louvre canvas duct.

There's a Hy-Duty Blowe for every ventilating job. Size 10″, 12″, 14″, 17″, 20″, 25″ i top horizontal, bottom hor zontal—top vertical or botto vertical discharge—Many su perior features insure the fine performance and economy.

Ask About HY-DUTY'S 3 *Big Sellers*

HY-DUTY BLOWER-FILTER

The best value in the competitive field—14″ blower, motor with integral overload protection, four filters, welded steel bottom, full floating motor mounting—variable speed pulley, openings cut and flanged, heavy gauge cabinet, canvas connection and clamps, wired in BX cable—*Hy-Duty quality —sensibly priced*—You can please your customer and outsell competition.



MANUFACTURED BY THE BLOWER DIVISION OF

SCHWITZER-CUMMINS COMPANY

GREATER AT FAN STREET INDIANAPOLIS U.S.A.

LAMNECK PREFABRICATED DUCT · AND FITTINGS · SERIES 600 SYSTEM

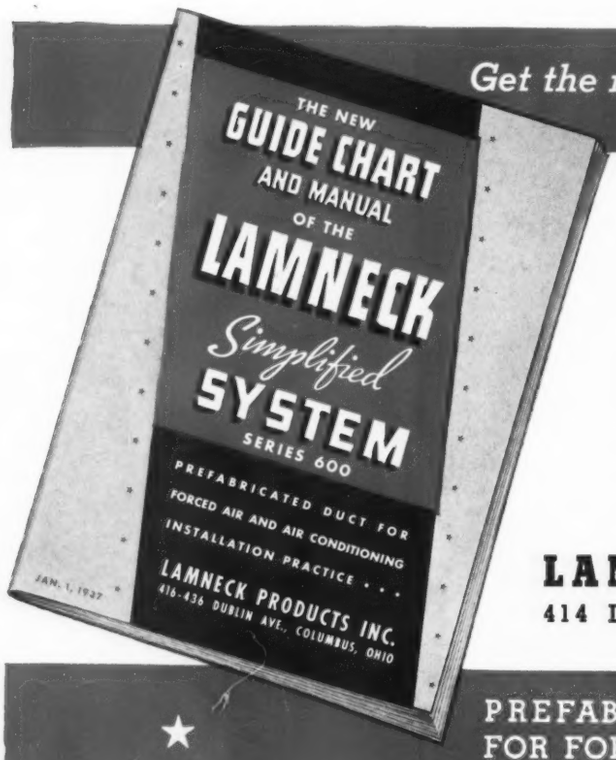
Simplified and Standardized to Meet Modern Installation Requirements

● As against 2000 items in the old *Series* 500, the new advanced LAMNECK *Simplified* System is standardized to include only 350 items. These are so interchangeable and so ingenious in assembly that the dealer with ease can take care of any installation requirements without time-wasting and expensive hand-fabrication. Also, he can determine accurately *beforehand* his profits and avoid the losses and profit uncertainties common to the old-fashioned method of making his own ducts and fittings.

A prominent dealer who previously hand-fabricated his own material, recently said, "Since I have seen LAMNECK's new *Series* 600 *System* I am confident that I can complete between two and three jobs now in the same time that I formerly took for one job."

The compactness of the *Series* 600 *System* offers a special advantage to the jobber, because in considerably less space, he can carry the complete stock necessary to give maximum service to his trade. This is made possible through the standardization on fewer items and an ingenious assembly practice that permits compact knock-down shipments.

LAMNECK *Series* 600 *System* is ready to ship from stock at surprisingly low prices. Its use means new economies, increased sales, and larger profits for you.



Get the new GUIDE CHART AND MANUAL IT'S FREE!

This valuable new book tells the whole story . . . shows clear photographs of every item in the complete LAMNECK *Simplified* System . . . gives full instructions for easy assembly . . . gives sizes, prices, and detailed information in a form that will save estimating time and reduce installation cost.

LAMNECK TAKE-OFF PAD—a practical service that enables the estimator to make complete cost estimates in shortest possible time. Saves time, eliminates costly errors, provides an effective check. Sent free on request together with as many copies of the Guide Chart and Manual as you desire.

LAMNECK PRODUCTS, INC.
414 DUBLIN AVE. • COLUMBUS, OHIO

★ PREFABRICATED DUCT AND FITTINGS FOR FORCED AIR AND AIR CONDITIONING

The New York State Convention

A PROGRAM containing an unusual variety of subjects presented by well-known speakers, coupled with excellent spring weather drew contractors from all parts of New York State to the 14th annual convention of the New York State Sheet Metal, Roofing and Air Conditioning Contractors' Association held April 26, 27 and 28 in Rochester.

"Roofing and Manufacturing"

Speaking on "Roofing and Waterproofing," Elmer R. Hyde of the Koppers Company showed slides of different types of built-up roofing including walking tile, asphalt and tar built-up, roofs for play purposes, roofs flooded with water for summer cooling and examples of better construction methods. Mr. Hyde explained briefly the progress made in research and application methods to advance the general art of roofing practice and to provide surfaces for modern requirements. The speaker touched briefly upon different methods of application which have been found advantageous under certain atmospheric or usage conditions and emphasized the importance of proper application methods including the use of expansion joints, waterproofing around flashings and at points where the roofing meets other structural parts of the building.

"5,000 Years of Roofing"

George Ballard, contractor from Rochester, speaking on "5,000 Years of Roofing," gave a short history of the first roof of history built in Babylon where tile was used without roofing boards. He explained that much of the early roofing material was marble three inches thick and held in position by copper nails or bronze nails and bronze clips.

Coming down to about 1200 A. D., Mr. Ballard explained that the most famous tile was the Flemish first introduced in France and laid without roofing boards but upon battens using hair mortar for joints. While the earliest tile in the United States was introduced by the Spaniards in California, it was not until about 1840 that the Zorite order in Ohio made a clay tile which would stand up under conditions found in New York State and New England.

Outlining the history of slate, Mr. Ballard said that Angiers, France, first laid black slate about 1100 years ago while English slate goes back approximately 1200 years. These roofing slates were not nailed, but were drilled and white oak pegs about 1¼ in. in diameter were pushed through the drilled holes and used to hang the slate on. Mr. Ballard had several dozen different types, weights and colors of slates from quarries throughout the Eastern part of the United States and outlined the peculiarities and characteristics of these slate.

"Business in Politics"

In "Business in Politics" H. A. Daniel of Newburgh, made the point that general reduction of taxes is one of the most pressing problems now confronting governmental agencies. He pointed out that during the years of the depression public employees generally did not take such drastic cuts as did workers or such reductions in income as were experienced by the average business man or contractor. Mr. Daniels suggested that relief should be handled in such a way that persons would want to go to work at the earliest possible moment.

"Our forefathers were always ready to do their duty as citizens, even fighting for their country, whereas the modern business man far too often is too lazy to even walk to the polls to vote. If we were really interested in general political good, it would be possible to reduce the present taxation burden from 25 to 50 percent. Today all government is costing the average tax payer from 20 to 40 percent of his total income. Spendthrift politicians are spending money out of all proportion to legitimate costs of conducting government. Seemingly, it has not yet occurred to politicians that reductions in expenditures might be made instead of continually trying to find new ways and means of raising tax money."

Problems in Forced Air Heating

S. Konzo of the University of Illinois, speaking on "Problems to be Considered in Forced Warm Air Heating" showed a drawing of the duct system and the arrangement and location of apparatus in the Research Residence for conducting the tests in mechanical warm air heating. Mr. Konzo pointed out that one of the problems first encountered was that of determining the friction loss, also the temperature drop in certain runs where the magnitude of these problems was not realized when the system was designed and installed.

On the subject of control, Mr. Konzo pointed out that in the Research Residence a number of different types of control systems were tried out with hand-fired coal as the fuel and that as a result of these tests one system was selected as best fitted to meet all general conditions. The particular type of system recommended showed reasonable flue gas temperatures and uniform bonnet temperatures without excessive temperature built up in the bonnet when the thermostat was satisfied, plus responsive operation of the equipment and the system to the thermostat. Briefly described, in this system, when the room thermostat calls for heat the draft damper opens unless the bonnet air temperature is already in the fan "run" zone, and as the bonnet temperature builds up the fan starts when the bonnet temperature raises to a preselected level. If the bonnet temperature is already in the fan "run" zone, the fan will start immediately. When

the thermostat is satisfied, the damper closes and the fan stops. Gravity action takes care of any excess temperature under usual operating conditions, but a safety device is provided to run the fan should bonnet temperatures become excessive. All of the control systems are described in Bulletin 266 of the University of Illinois Experiment Station.

Register Location

Regarding the problem of proper register location, Mr. Konzo declared that no one location can be cited the best location under all circumstances and that the register location should be selected with all the various factors in mind. Indicating some of the results of tests at the Research Residence, Mr. Konzo showed that open faced baseboard registers without louvres showed minus 4 degrees to a plus 2 degrees temperature differential above and below the breathing line level, for register velocities of 300 feet per minute as the maximum. High sidewall registers showed differentials from minus 5 to plus 5, working down to plus and minus one degree above and below the breathing line level as the register velocity was increased. A conclusion to be drawn was that the minimum register face velocity for high sidewall registers should be 300 feet per minute and that 500 to 600 is an average working velocity.

Baseboard registers with louvres directing the air downward toward the floor at an angle of 15 deg. showed from minus 3½ to plus 1 degree differentials above and below the breathing line level, and in this particular case the velocity is not nearly so significant, but 500 fpm might be selected as a maximum velocity. As a general proposition in high sidewall registers, the chief problem is to obtain sufficient velocity to carry the air across the room, whereas in baseboard registers velocities must be reduced in order to eliminate objectionable hot air draft.

Registers for Cooling

For summer cooling, registers may be either baseboard horizontal or baseboard with louvres directing the air upward at an angle of 60 deg. or high sidewall registers, and properly applied all of these registers showed an approximate temperature differential between floor and ceiling of about six degrees. The chief objection to baseboard registers throwing the air horizontally in summer cooling is the setting up of a floor draft which is not satisfactory to the owner.

Mr. Konzo also introduced the problem of temperature drop in ducts and showed on the basement duct plan for the Research Residence where temperature differentials had occurred and the approximate magnitude of these temperature drops. In general the results from the Research residence indicated that a working temperature drop of one-half of a degree per foot of duct is a safe factor. Mr. Konzo showed where the addition of properly felted storm sash reduced fuel costs as much as 20 percent and at the same time raised the temperature of the inside surface of the glass approximately four degrees and raised the floor temperature approximately three degrees. The addition of tight storm sash also raised the condensation point from 20 to 30 percent.

"Business Outlook in 1937"

H. T. Richardson of Richardson & Boynton, speaking on "Outlook for Business in 1937" made the assertion that optimistic economists give us from four to five years of good business, whereas pessimists give us from two to three years of good business. Mr. Richardson also pointed out that the legislative situation is serious and that despite the fact that the Roosevelt program seemingly is leaning toward new and increased construction and also a revival of NRA in some form, many of the present bills have left business in a state of confusion and that these laws seemingly indicate that there is to be increased control of retail selling.

Mr. Richardson stated that business reports indicate we are back at the 1929 general volume of business and that the heating business in particular is enjoying the greatest volume of the last eight years with approximately a fifty percent increase over the first quarter of 1936. Mr. Richardson declared that competition from large corporations has been severe and that in his estimation much of the early equipment introduced was not thoroughly tried out before introduction. Further, that the abolishment of FHA, Title 1, covering modernization, has not meant a curtailment in time payment sales as practically all manufacturers now have a plan available making it possible for the purchaser to buy under equivalent terms.

"Copper for Roofing"

"Copper for Roofing" was the subject of a talk by Carter S. Cole, who declared that all of the copper manufacturers are now advising architects that a good roof is entitled to a fair price and that cheap prices inevitably bring cheap jobs. The new book of the Copper & Brass Research Association "Sheet Copper" will be available within a very short time and Mr. Cole suggested that all con-

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tractors handling copper for architectural metal work should have a copy of this revised and enlarged edition. Mr. Carter pointed out that some of the recent replacements of copper as a roofing material were not a result of the deterioration of the material but rather a proof that poor construction and application methods inevitably result in a failure of the roof. Mr. Cole had a number of slides taken from the new edition of "Sheet Copper" showing application practices which should never be used.

"Merchandising in 1937"

Frank Harmon of the Lennox Furnace Company, Syracuse, speaking on "Merchandising," introduced the subject of proper approach to the purchaser.

Mr. Harmon explained that the average sale is made through an appeal to one of the three mind senses, namely, feeling, reasoning, and the will to buy. Declared Mr. Harmon, "I am always asked, 'How are prices in Syracuse?.' I do not know what the prices are in Syracuse because we do not sell on price, but on value. When we can't sell on value, we will quit business. No man here is dressed in overalls. You don't bargain with your doctor. Pride brings you to this convention dressed as well as you can or compels you to call your physician in cases of emergency without first haggling over price. Cost and price have seemingly become a disease. We contractors try to figure out just who will be bidding on certain jobs and then we employ every possible means to cut prices in order to be under the price of the person we suspect of bidding. In the last six years in Syracuse, we have established a new basis of operation. We train young salesmen, obtaining these men from an advertisement which we publish in a Sunday newspaper. Two weeks ago we had an advertisement through which we received fifty-four applications, mostly college graduates. These men start in by selling cleaning orders. If you ask why cleaning, we reply—to establish a value with every home owner in our territory. Our cleaning costs us real money, but we believe the expense of cleaning which we do not get back in the price at which we sell cleaning is cheap and very satisfactory advertising. These canvassers find that four out of twelve calls result in entrance to the basement after which they make a real survey of the heating system and esablish full information in our office files. We have, in Syracuse, exactly the same selling problems you face, in which we are merchandising against specialty sales organizations and manufacturers, and we also have the situation where many of our contractors are bidding against one another for a labor job amounting to approximately 250 dollars. We do not bid on such work nor will we bid unless things change very much for us. At the present rate of growth the specialty sales organizations will outnumber the old line heating contractors within a very few years. Yet in our own instance sixty percent of the jobs we sell to Syracuse owners are sold without competition and at a satisfactory price to us."

"Insurable Hazards"

"Insurable Hazards In Our Business" was the subject of an address by Roy Duffus, secretary of the James Johnston Insurance Company, who declared that failure to carry adequate insurance causes many business failures and that insurance costs should be a fixed part of every overhead expense. Suggesting that contractors should analyze their insurance needs, the speaker suggested that:

1. They should read all insurance policies to see that the policy adequately describes all of the operations the policy is intended to cover.

2. The new ventilation laws in New York State require the contractor to establish his operation, in other words the things which he does, and all operations not specifically itemized in the contract are not covered from an insurance standpoint.

3. Insurance agencies can add clauses to cover all operations if the insurance man is so requested.

4. Under present laws all subcontractors must possess and be ready to show certificates of coverage to the general contractor who in turn must be able to prove that his subcontractors are adequately covered from an insurance standpoint.

5. Failure to carry suitable liability insurance subjects the contractors to $500 fine for each offense.

6. Officers of corporations may or may not be covered by insurance depending upon the insurance contract and the contractor should know just how this coverage is stated in his policy.

7. Generally, public liability should be carried with the same insurance company as other insurance because public liability is based upon the same payroll.

8. Policies should be checked to see whether satisfactory coverage is obtained against mechanics of other contractors suing for injury or from suit by insurance companies covering mechanics of other contractors.

9. A new insurance clause covers products liability which covers the contractor for accidents caused by products after the contract is finished. This particular clause applies to air conditioning contracts.

10. The usual insurance against boiler explosion covers only explosion of the steam or water in the boiler and does not cover explosions in the combustion chamber which must be covered by furnace explosion. This also applies to oil burners, gas furnaces, burners, etc.

"Unemployment Insurance"

Joseph P. Craugh, Assistant Attorney General of the New York State Department of Labor, addressing the convention on "Unemployment and Compensation Insurance," explained that "While social security has been in effect approximately two years, efforts to secure the same result have been advocated in New York State for several years but

(*Continued on page* 102)

For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 116 and mail to us. Complete information will be forwarded.

● Indicates product not listed in 1936 Directory

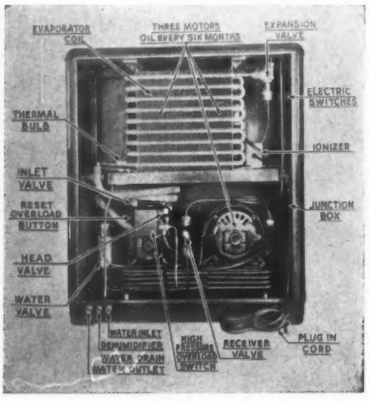
△ Indicates product and manufacturer not listed in 1937 Directory

NEW PRODUCTS

△57—Climax Cooler

Climax Machinery Co., Indianapolis, Indiana, is introducing Climax 5-point air conditioning — refrigerates, de-humidifies, circulates, filters and ionizes —for the home, office or store.

The Climax has an attractively grained walnut cabinet. Model 20 is sized 32 x 16 x 38, equipped with ¼

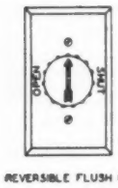


HP motor, water cooled condenser and compressor head, and one 1/75 HP 10-in. oscillating fan. Freon is the refrigerant and there are three other models with slightly larger cabinets. Model 20 has a capacity of 2,503 Btu per hour; Model 30, 6,379 Btu; Model 40, 9,949 Btu; and Model 50, 12,980 Btu per hour.

◆

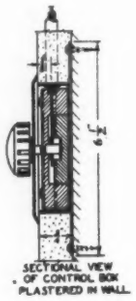
●58—Grilles, Air Deflector and Control

Tuttle & Bailey, Inc., New Britain, Conn., lists four new products in their Catalog 37—Ferrogrid Grille, a combination vertical and horizontal air deflection, Hivelair Grille, and Remote Control.



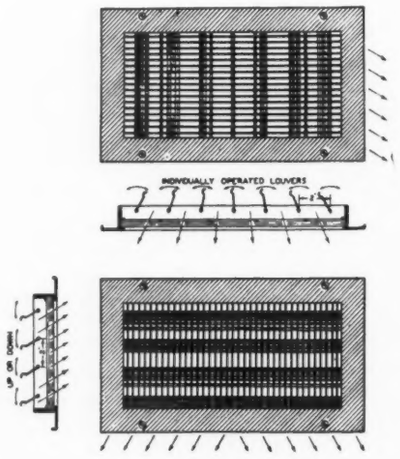
REVERSIBLE FLUSH PLATE

Patent Applied for



SECTIONAL VIEW OF CONTROL BOX PLASTERED IN WALL

The Ferrogrid Grille of interlacing bar design has an unusually high percentage of effective area with horizontal bars spaced ½ in. on centers.



Where a change in the direction of the air path from that originally designed is necessary, a combination unit has been designed which provides vertical as well as horizontal deflection of the air stream in the same unit. Adjustable blades are set behind any standard air conditioning grille. The back blades will always be run opposite to the direction of the face bars as standard. All blades are individually adjustable and a special tool is furnished for the operation of the back blades through the front grille.

Where high velocities are necessary, the company offers Hivelair and Jetair grilles, specially designed to permit the use of abnormally high air velocities without entailing noise or whistle.

Remote control is an ingenious device designed to enable the occupant of a room to control the volume of supply air at a point considerably removed from the volume damper. This device has been used with particular success in air-conditioned hotel rooms, apartments, offices, etc.

◆

△59—Micro-Arc Welder

Micro Products Company of Peoria, Illinois, is introducing the new Micro-Arc Welder. These units are of the floating coil type but redesigned and simplified for lower manufacturing costs.

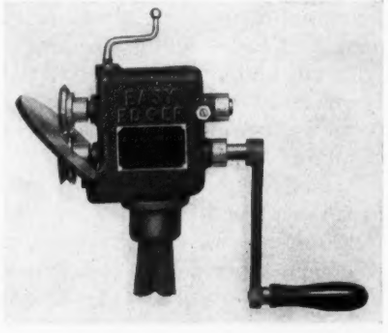
An outstanding feature of this type of welder is the infinite control of welding heat, by simply turning a crank, which varies the association of primary and secondary windings in the transformer.

Micro-Arc Welders are said to weld anything from 26-ga. steel sheets to the heaviest plates, producing smooth, flowing welds of exceptional strength and ductility.

◆

60—Flanging Edges

Ward Machinery Co., 564 West Washington Boulevard, Chicago, announces the Easy Edger, a new type machine for flanging edges of sheet metal 20-gauge and lighter. They say this machine will turn perfect right angle flanges on inside or outside curves, straight or irregular shapes. Having no gauge, it is more simple to operate than a burring machine and it turns out a perfect uniform edge regardless of whether the curve be of inside or outside radius.



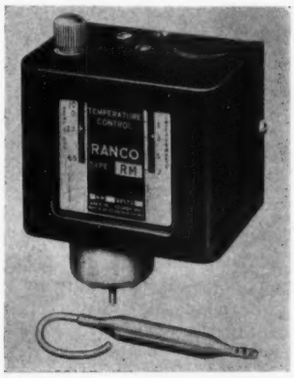
The Easy Edger is designed to be a distinct advantage for the ventilating and air conditioning contractor on account of its accuracy, speed and uniformity and is ideally suited for fittings because it will turn a flange on the throat as easily as on the heel of the square elbow. It is not adjustable for heighth and turns one size of flange only, approximately 7/32 in., which is found to be the most suitable size flange for ventilating or air conditioning work. It is constructed very sturdily with ground shaft, hardened rolls and steel cut gears.

New Products . . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 116

△61—New Control

Ranco, Inc., Columbus, Ohio, announces a new control—Type RM Ranco temperature and pressure control—said to be ideal for use where temperature or pressure must be held to very close limits, to compensate for the over-run caused by the inherently



sluggish characteristics of other units comprising the heating or cooling system.

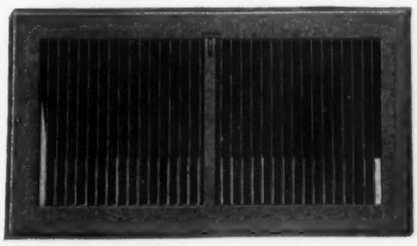
This device is available in temperature ranges from —20 to +90 deg. F. Extremely low differential (1 deg. or less) adjustable up to 7 deg.

◆

62—Adjustable Bar Register

United States Register Company, Battle Creek, Michigan, has a new line of adjustable-bar fin-type registers made in horizontal and vertical position, and one and two-piece sidewall with Seal-Pak frame, also for baseboard installation. The spacing is sufficiently set to form a compromise between the open and close-mesh patterns, so they can be used with either style of the popular fixed diffusion of A-C registers.

The register is constructed so that the louvers can be elevated to give a 60 deg. upflow for summer cooling or



60 deg. downflow, or any fixed degree between straight and 60 deg. by an operating mechanism that is concealed back of the face, the vanes of which can be lowered or elevated by means of a steel pin extending through a small hole in the face of the mullion of the register.

The same style of register in a vertical bar is also available.

◆

63—Slow-Speed Drill

Skilsaw, Inc., Chicago, announces two new important additions to their line of Skilsaw ball bearing electric drills.

The new ¼ in. and ½ in. slow-speed, high torque Skilsaw drills have been developed particularly for drilling in steels of high nickel content—

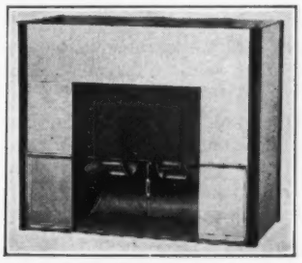
Monel and Allegheny metals, stainless steel, etc. The slow speed of these new tools lengthens materially the life of twist drills, eliminating the need for frequent sharpening. Drilling speed, however, is not sacrificed because the high torque feature makes it impossible to stall the drills at maximum drilling capacities.

Both models are available in speeds of 350, 450, 600 and 750 r.p.m. Their slow speed makes them especially adaptable to wood boring.

◆

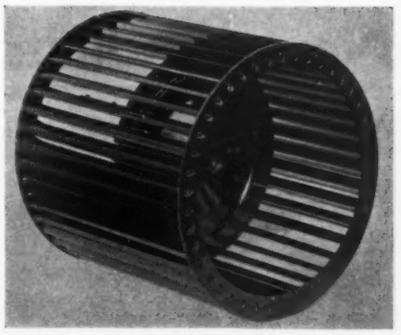
64—New Package Unit

The Emerson Electric Manufacturing Company, St. Louis, Missouri, announces a complete new line of direct-drive package unit furnace blowers.



These are being manufactured in three sizes with maximum free air deliveries as follows: No. 14, 1100 c.f.m., No. 17-E, 1420 c.f.m., and No. 30-E, 2,600 c.f.m. The ever popular No. 50 Emerson-Electric furnace blower with free air delivery of 4590 c.f.m. is also available for 1937. The special design blower wheels are mounted directly on the motor shaft and the motor is rubber mounted to provide quiet operation.

Exterior of housing finished in red, scroll in black and corner posts in black "crackle."



65—New Centrifugal Blower

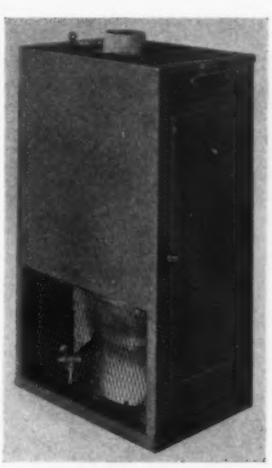
Viking Air Conditioning Corp., Main & Center St., N. W., Cleveland, recently announced a new development in centrifugal blowers—the Viking "Slip-Lock" blower which has an entirely unique construction. It is possible to assemble the wheel in a jig so that both ends of the blade are locked in at one time. This eliminates any twist or eccentricity in the wheel. This method both improves the construction and materially reduces the cost of production.

The makers claim the "Slip-Lock" blower is exceptionally quiet. Five sizes are being furnished—10½ x 12, 12 x 12, 14 x 14, 16 x 16 and 16 x 20 inches.

◆

•66—Trailer Circulating Heater

Duo-Therm Division, Motor Wheel Corporation, Lansing, Michigan, announces a new fuel oil burning trailer circulating heater which the manufacturer claims offers completely new standards of trailer-heating efficiency, cleanliness and convenience.



The entire unit is enclosed in an attractive tailored cabinet finished to harmonize with every type of trailer interior. Measuring 12 in. wide, 18 in. deep and 30 in. high, it requires a minimum of trailer space and is adaptable to any trailer interior layout.

The Duo-Therm Heater operates on ordinary fuel oil or kerosene. It is listed as standard by the Underwriters' Laboratories.

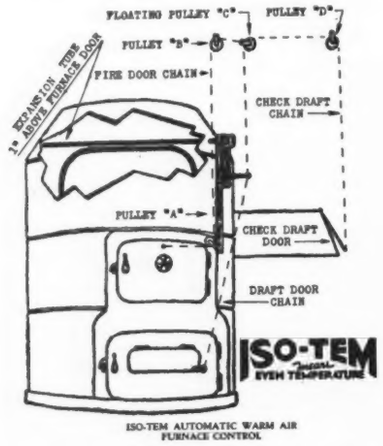
New Products . . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 116

△67—Automatic Furnace Control

The Air Conditioning Supply Co., 1893 East 55th Street, Cleveland, Ohio, has national distribution of the ISO-TEM automatic warm air furnace control.

The mechanism consists of a steel rod, brass tube, slotted link and control arm or lever, to the eye of which



ISO-TEM AUTOMATIC WARM AIR FURNACE CONTROL

are attached the chains which control the positions of the draft and check dampers.

Adjustment is by a simple hand wheel, attached to a screw, the point of which bears against the link at a point slightly higher than the contact of the rod.

◆

68—Resilient-Mounted Motors

Wagner Electric Corp., 6400 Plymouth Avenue, St. Louis, is manufacturing annular-type resilient-mounted motors, a new mechanical modification to their line of fractional-horsepower motors.

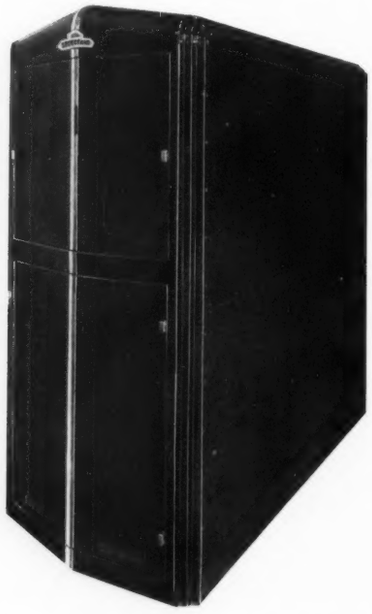
Annual resilient mountings are now available on repulsion-start-induction, split-phase, capacitor and polyphase types of Wagner motors. This type of mounting has the advantage in that there is less vibration—hence less noise, since the rubber mounting supports which absorb the vibrations are as close to the shaft center as possible.

The motor base is made of rolled sheet steel, shaped in the form of a cradle for supporting the motor.

69—Oil-Fired A. C. Unit

S. T. Johnson Co., Oakland, California, and Philadelphia, are distributing two new pieces of literature—one covering the new Selectair and the other the new Johnson pressure type fuel oil burner.

The Selectair is a heat and air conditioning unit with year-round domestic hot water. It cleans, humidifies,



heats with oil, circulates, provides for filtered and forced air circulation in summer, and permits a split or dual system whereby clean, humidified and circulated air can be supplied to any or all rooms or if desired certain rooms such as bathrooms and kitchens can be heated by steam radiators or convectors, while the rest of the home is air conditioned.

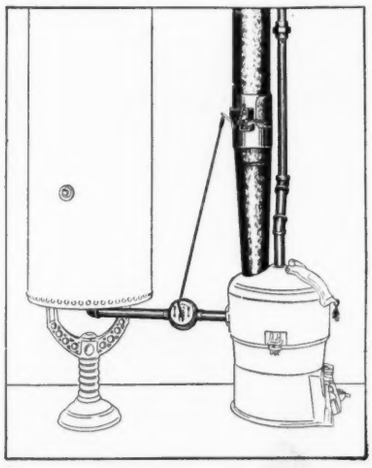
Year round hot water is produced without attention or the expense of additional equipment. The domestic hot water coil is incorporatetd in the Selectair specially designed boiler.

The heart of the Selectair is the Johnson Bankheat pressure type burner, controlled by a sensitive room thermostat and a master safety relay and boiler or furnace limit controls that keep the boiler or furnace heats within predetermined limits. As the burner stops, the counterbalanced draft shutter closes, prohibiting the passing of cold air through the boiler.

◆

△70—Hot Water Regulator

Delaware, Lackawanna & Western Coal Co., 120 Broadway, New York City, is manufacturing the "blue coal" hot water regulator to be attached to any tank heater. Installation is very simple, they say, and the regulator can be installed on any type of heater. Only a small amount of water, a gallon or two, they say, drawn from the



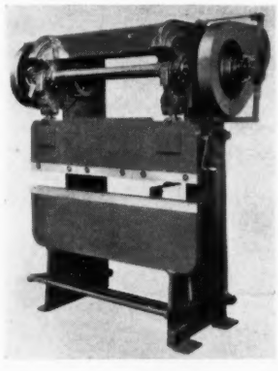
storage tank will cause the regulator to open the dampers and bring the fire up and renew the hot water storage. The regulator governs the rate of coal burned to meet the demands for hot water.

◆

71—Junior Press Brakes

The Allsteel Press Company, Chicago, is introducing an improved line of Junior press brakes of interest to the sheet metal industry generally, as they provide means for doing many types of work ordinarily done on larger, more expensive equipment. It is said that any of these six small machines will make sharp bends the full length of bed and ram, within their rated capacities.

The smallest of the six will make a sharp bend in 14 gauge mild steel, 52 in. long over a ⅝ in. female die opening, while the largest will make this same bend 78 in. long. Shorter bends



in heavier gauges also can be made with slightly wider female die openings.

The new Verson Allsteel Press Brakes are regularly furnished with a complete motor "V" belt drive, friction clutch, motor and starter, lower die holder and sectional ram clamp.

N.A.S.M.D.

The following were elected officers of the National Association of Sheet Metal Distributors, at the 26th annual convention held in Cleveland on May 5 and 6:

President—A. W. Howe, The J. M. & L. A. Osborn Co., Cleveland, Ohio.
Vice-President—Robert H. Lyon, Lyon-Conklin & Co.,Inc., Baltimore, Md.
2nd Vice-President—A. J. Becker, Ohio Valley Hdwe. & Roofing Co., Evansville, Ind.
Secretary-Treasurer—George A. Fernley, Philadelphia, Pa.
Assist. Secretary-Treasurer—Percy F. Hord, Philadelphia, Pa.

Executive Committee

Eugene Foley—Bayonne Steel Products Co., Newark, N. J.
J. M. Burbank—Farwell-Ozmun-Kirk & Co., St. Paul, Minn.
E. H. Hoffeld—The Ferdinand Dieckman Co., Cincinnati, Ohio.
H. B. Thompson—Conklin Tin Plate & Metal Co., Atlanta, Ga.
Joseph Stelwagon—Stelwagon Mfg. Co., Philadelphia, Pa.
George O. M. Johnston—McClure-Johnston Co., Pittsburgh, Pa.

Advisory Board

F. O. Schoedinger—F. O. Schoedinger, Columbus, Ohio.

The National Association of Sheet Metal Distributors is affiliated with the National Wholesale Hardware Association.

◆

St. Louis

The Associated Sheet Metal, Air Conditioning and Heating Contractors of St. Louis, Inc., held an overflow meeting Monday evening, May 3rd, 1937, at the Claridge Hotel with over one hundred present.

President Greaser introduced the Guest Chairman, Oscar P. Brauer, who started the meeting off by introducing E. T. Farris of the Emerson Electric Company. Mr. Farris had offered his assistance and guidance to the association and spoke on the purposes of such an organization and what they must do to function successfully.

G. W. Bendorf of the Wheeling Corrugating Co. read the proposed program as set up by the Committee on Dealer Education.

Mr. Roseborough, Jr., Mr. Wolff, Mr. Haynes, Mr. Farris and Mr. Bendorf comprise a temporary committee on Dealer Education work for the jobbers and manufacturers' association in connection with the Sheet Metal Contractors Association.

Education for the dealer includes the standard code for gravity warm air furnaces; location of registers; grilles and return air systems; value of return air; sizing leader pipe area to compensate for unheated spaces such as hallways; an examination in blueprint form for taking off materials and estimating the labor; setting a furnace; chimney troubles and corrections; common diseases and failures of warm air installations, their causes and how to correct them; converting gravity to forced air; humidification and filtering in the heating plant; the mechanical code for forced air heating; installation for forced air heating; automatic heating with oil, gas and stokers; controls for forced air and automatic heating systems; value of heating plant to the resale value of a residence; and introduction of accounting systems for sheet metal shops.

Mr. Otten outlined what the association was expected to do in connection with a new proposed code and explained that at the next meeting they would have the first draft for discussion.

Bob Wettstein of the American Artisan congratulated the members on the splendid showing present and the program they had adopted.

W. Cavallo,
Secretary.

◆

N. W. A. H. & A. C. A.

The Mid-year Convention of the National Warm Air Heating and Air Conditioning Association will be held at the Hotel Cleveland, Cleveland, Ohio, on June 8, 9 and 10 with meetings of the Board of Directors and the Association's standing committees on Tuesday, June 8.

The program as outlined follows:

"Comments and Observations," by President W. L. Rybolt.
"Homes for People with Lower Income—The F. H. A. Activity for Same," by A. O. Eberhart, Special Assistant to the Administrator.
"Balancing the Job," by D. O. Price of Toronto.
"Humidity and Problems Incident Thereto," by L. G. Miller of Lansing.
"Corrosion of Air Conditioning Ducts," by F. H. Ramage.
"Merchandising Our Products for a Profit," by Nelson B. Delavan of Des Moines.
"Research Advisory Committee Report and Observations," by F. G. Sedgwick.
"Result of Investigation of Summer Cooling in the Research Residence," by A. P. Kratz.
"Two Speed Control System for Fan Operation," by S. Konzo, Urbana.
Dinner and Aquacade at Great Lakes Exposition.
"Our New Technical Mechanical Installation Code," by J. D. Hoffman, assisted by E. B. Langenberg, Fred R. Bishop and B. F. McLouth.
"Electric Motor Design and Application for Our Installations," by J. A. Rodgers, St. Louis.
Golf tournament at Westwood Country Club with prizes.

A cordial invitation is extended to all dealers, heating contractors and others interested, to be present.

Allen W. Williams,
Managing Director.

◆

Gary District Meeting

The District Meeting of the Gary District of the Sheet Metal Warm Air Heating & Roofing Contractors' Association of Indiana will be held at George Levent's, Robertsdale, at 6:30 P. M. (Daylight Saving Time), Friday, May 14th. The meeting will be in the form of a dinner and will be followed by talks and discussions on subjects of interest to the trade.

The Secretaries Conference is set for the afternoon of the same day and the Secretaries from Ohio, Michigan, Indiana, Illinois and Wisconsin will stay over as guests of the District Meeting. Representatives of the Chicago Associations will also be present.

The 1937 schedule of District Meetings, open to everyone connected with sheet metal or the furnace trades, and sponsored by the Sheet Metal and Warm Air Heating Contractors' Association of Indiana, follows:

Gary, Friday, May 14.
Elkhart (South Bend District), Friday, June 18.
†Indianapolis, Saturday, July 31.
Muncie, Friday, September 10.
Columbus, Friday, October 22.
Bedford, Friday, November 19.
*South Bend, January 18, 19, 20.

†Picnic. *State Convention.

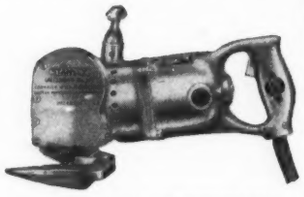
Chas. L. Gatz,
District Governor.

STANLEY UNISHEARS

MAKING LIGHT WORK OF HEAVY MATERIAL

Making bus bodies presents a range of cutting problems from light body sheets and special trim to heavy plate steel. Here we see a Stanley No. 144 Portable Unishear and a Stanley No. A-10 Stationary Unishear teamed together for production efficiency.

Unishear cuts as fast as you feed, without distortion of the metal. Any shape — curves, angles or notches—with hairline accuracy. Its 2400 shear cuts per minute leave smooth, clean edges. 100% safe for the operator.



PORTABLE UNISHEARS

— 3 sizes to cut 18, 16 or 14 gauge hot rolled steel. Cut sheet materials in the shop or on the job.

Ask your Stanley distributor for a free demonstration. See what Unishear can do for you. Catalog 64M, free on request, describes Unishears and other time- and money-saving Stanley Electric Tools.

STATIONARY UNISHEARS

— floor, bench and pedestal machines — five sizes to cut up to ¼" boiler plate. Cut any shape—and leave smooth, finished edges.

STANLEY ELECTRIC TOOL DIVISION
The Stanley Works
131 Elm Street, New Britain, Conn.

STANLEY UNISHEARS
THE ELECTRICALLY DRIVEN HAND SHEARS

New York Convention

(*Continued from page 97*)

always defeated. Mr. Craugh explained the ten titles of the act, particularly titles 8, 9 and 10. The speaker stated that in New York in 1936 the Social Security law brought in some $36,000,000 and in 1937 it is estimated that receipts will reach a total of $60,000,000, and that by 1938 monthly payments will reach $7,000,000. He also explained that in New York unemployment compensation applies to all employers of four or more as compared to the Federal law of eight or more.

"Modern Housing"

John J. Wade, A. I. A., Chief Architect of the Federal Housing Administration, discussing "Federal Housing" at a joint luncheon of Rochester architects and contractors attending the convention, said that up to date FHA had sponsored more than $1,000,000,000 worth of loans with only fourteen foreclosures. And that the basic intention of the FHA Act was to eliminate booms and depressions in the building industry and to raise the living standards of the lower income group.

Declaring that the Department of Labor statistics show that eighty percent of our population earn less than $2,500 per year, and upon the basis that a home should cost not more than two times the annual income, the construction industry finds itself faced with the proposition of constructing houses to cost $5,000 or less. The speaker declared that in his judgment what the building industry needs is mass production for a price and that one of the problems to be solved is the design of equipment suitable for the $5,000 house rather than for the $15,000 house. In the speaker's estimation little has been done along this line as yet.

"The Technical Code"

E. B. Root of Dail Steel Products, Lansing, Michigan, introduced the new Technical Code by placing upon the blackboard a typical residence and from a data sheet distributed at the meeting explained how the various factors in the new code are arrived at. Mr. Root explained that one of the difficulties with the Mechanical Code and the Standard Code was the fact that the infiltration factor was esablished upon the basis of cubic contents, whereas as a matter of fact, infiltration has very little to do with cubic contents and depends chiefly upon construction. He also explained how register temperature can be established upon a predetermined number of air changes in order to provide satisfactory ventilation for heavily insulated houses. Another problem covered in the new code is the compensation in register temperature for temperature drop in ducts at one-quarter of a degree drop in temperature per foot of actual length of duct.

Mr. Root developed the heating characteristics for the typical residence, calculating the heat loss, the cfm and register temperature for each room

and then determining the size of registers, stacks, branches and main trunk according to the new code. The calculations will not be reported here in view of the fact that the new code is being published in American Artisan and typical procedure has been publicized previously in reports of addresses by Mr. Root and Mr. McLouth.

Choosing and Picking Business

"Choosing and Picking Business" was the subject of the talk by Edwin A. Scott, Editor of Sheet Metal Worker, New York, who declared that whereas just a few months ago all contractors were grabbing all possible business, today many contractors have more work than they can handle with the result that these contractors are picking and choosing their jobs. Mr. Scott declared that in many parts of the country there is a shortage of good mechanics and that the demand for materials is increasing from all parts of the country with increases in prices to be anticipated for some time to come. The chief need today is for the contractor to know his costs, not only the cost for material and labor, but also the cost of doing business, declared Mr. Scott. Appreciation of these costs enables the contractor to pick and choose his job and to forget work which must be unprofitable at the final accounting.

Mr. Scott also cited as a problem of today's operation the quoting of sales prices by specialty selling agencies leaving to the contractor bids only upon metal work which in many instances is only a small portion of the total selling price of the job. Mr. Scott declared that without the profit to be obtained from selling the equipment, the metal work alone must bear an unusually high overhead in order to be profitable. The only solution is for the heating contractor to also sell the equipment and take the profit from the material as well as from the labor.

"Codes and Licensing"

J. D. Wilder, Editor of American Artisan, speaking on "Codes and Licensing," declared that if the average contractor took home all of the suggestions offered at the convention and applied these suggestions, there would still be some question as to profit, due to the fact that small contractors willing to work for the equivalent of day wages set the price for metal work in many localities and education or other means suggested are unsatisfactory as a final solution to this problem. He suggested that the only adequate solution seems to be the application of proper codes which set a minimum standard for mechanical or gravity heating and air conditioning work which in turn tends to raise prices for work in any given community. These codes of minimum requirements should be further supplemented by licensing agreements wherein contractors must pass satisfactory examination and must be able to establish financial responsibility in addition to a knowledge of the work they do.

In the discussion of Codes and Licensing, several contractors cited instances where these codes

"Four years ago, we installed a Lincoln Welder and started to branch out into various lines of metal specialties. Our business volume increased to the point where we needed additional arc welding facilities. Today, we have three Lincoln Welders and use on an average of 200 lbs. of welding electrodes per month.

"Our arc welding work includes machine guards, vent ducts, tables, frame-work and many metal specialties built of black iron, stainless steel, Monel metal, brass, copper and aluminum—from 24 gauge to ¼-inch material.

"Through our wide and varied experiences, we know that we can do this fabricating work at lower cost by arc welding. We are very much pleased with the profitable results given by our Lincoln Welders."

M. A. FEINER, Secy.
P. Feiner & Sons, Inc., New York, N. Y.

Have you investigated the new "SA-150"? With a range of 45-200 amperes, it will handle a wide variety of work . . . light and heavy. The price is only $250. Easy terms can be arranged.

MAIL this COUPON

THE LINCOLN ELECTRIC CO.,
Dept. EE-368, Cleveland, Ohio
Send a free copy of Bulletin 314 describing the new "SA-150" Welder.
Name Position
Company
Address
City State

HERE'S PROOF OF THE POWER AND DRILLING SPEED of SKILSAW'S NEW DEFENDER DRILLS

THIS ½" DEFENDER DRILL
drilled a ½ in. hole in ¼ in. stock
in ONLY 28 SECONDS!
drilled a ½ in. hole in ½ in. stock
in ONLY 40 SECONDS!
S.A.E. 1020
COLD ROLLED
STEEL
½" DEFENDER
$35.00
¼" DEFENDER
$19.50
THIS ¼" DEFENDER DRILL
drilled a ¼ in. hole in ¼ in. stock
in ONLY 13 SECONDS!
drilled a ¼ in. hole in ½ in. stock
in ONLY 22 SECONDS!

NEVER before such performance . . . such quality construction and engineering in low priced drills! Bearings are ball and self-lubricating Oilite bronze. Motor has extra overload capacity for cool running and longer life. Special alloy-steel gears, helical cut for quiet operation. Die-cast alloy frames for strength and lightness. Compare their specifications, power and speed and you will see why DEFENDER Drills are the biggest drill "buy" on the market.

See Your Distributor and Write for Our Catalog

SKILSAW, INC.
Dept. E., 3320 ELSTON AVENUE, CHICAGO

210 E. 40th Street, New York • 52 Brookline Avenue, Boston
312 Omar Avenue, Los Angeles • 2065 Webster Street, Oakland

have been successful in establishing a better range of prices and workmanship and have tended to increase the general overall of net profit of the work done. It was also brought out in the discussion that many communities are seriously considering codes and licensing agreements in order to protect the buying public and to maintain the standards which this industry has established through research and actual experience.

"Stainless Steel"

R. S. Lynch of Republic Steel Corporation, speaking on "Stainless Applications to the Sheet Metal Industry," outlined briefly some of the historical development of stainless steel through the first introduction of stainless steel cutlery, then through stainless steel for such architectural projects as the Chrysler Building and the Empire State Building in New York down to the present time when stainless steel is finding wide application in the fabrication of many products.

Mr. Lynch stated that the mills have established certain practices which should be employed by the contractor in order to obtain the best results from the investment in this material, and pointed out that:

1. Stainless steel ordinarily is protected by a coating of heavy oil or the application of paper or some other protective material and under average shop conditions these protective materials should be left on the sheet until the product is finally completed.

2. Stainless steel can be soldered successfully, but to resist corrosion every bit of the soldering flux must be removed by careful cleaning. Muriatic acid can be used as a flux and 50-50 solder can be employed but special stainless steel solders usually result in a more satisfactory job. In soldering, large irons should be used because of the low heat conductivity of the material.

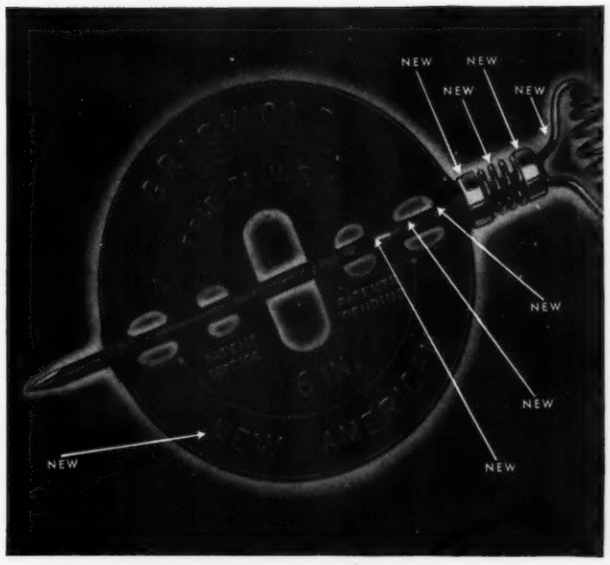
3. Stainless steel can be braised, but welding is recommended in which cases a mixture of zinc chloride and ammonium chloride makes a good flux for the braising or soldering applications.

4. The commonly used 18-8 stainless steel can not be hardened by heat treatment as the material becomes ductile at temperatures of 900 to 1,000 degrees, just the opposite to the effect desired.

5. Each of the stainless steels now manufactured has peculiar characteristics and the intelligent contractor will specify the particular use to which the product is to be put, and let the manufacturer subscribe a particular stainless steel analysis.

Welding Demonstration

The Lincoln Electric Company conducted a demonstration of the welding of galvanized iron and steel and showed by actual operation just what practices should be followed in order to successfully weld with the electric arc various stainless steels of different analyses and also galvanized iron as well as these materials welded to other materials.



Easier installation with the Griswold

NEW AMERICAN DAMPER

Stove and furnace men everywhere are hailing the genuine Griswold NEW AMERICAN Damper as the greatest advance in damper design. New, exclusive features make it even easier than ever to install. Jobbers find that its superior quality makes it the most satisfactory and easiest to sell. Dealers find that a very small difference in price makes a vast difference in quality and satisfaction when they specify Griswold "New American."

NEW FEATURES FOR EASIER INSTALLATION

1 New improved design with hump on spindle that goes straight through pipe before spindle point enters opposite side of pipe. (No need to put hand inside stove pipe while installing.)

2 Improved spindle slips easily and freely through plate. A twist of the wrist and hump on spindle drops into notch, insuring positive lock.

3 Exclusive hump guide on plate leads spindle hump into locking position without fail.

4 New design reversible plate allows one-piece, nonbreakable steel spindle to be easily inserted from either side.

5 Size marked on both sides of plates.

6 Sharp point of spindle pierces any ordinary stove pipe, leaving a clean hole same size as spindle.

7 New improved full tension spring with nickel finished ferrules, not affected by heat.

8 Ferrules and spring do not fall off spindle while assembling . . . a useful time-and-temper-saving feature.

WRITE TODAY for details and prices on the world's most complete line of dampers. Regular size 3″ to 7″. Furnace, 8″ to 18″. Oval, 4″ to 8″. Or place order with your jobber now for specified delivery dates. THE GRISWOLD MFG. CO., Erie, Pa.

GRISWOLD

NEW AMERICAN
The Original Steel Spindle
REVERSIBLE DAMPER

Here's A Record For the World To Shoot At . . .

WE knew the Super was a good furnace cleaner — we've built cleaners for 26 years — but how good is revealed in the records from a lot of typical Super owners. No hand-picked list but really representative shops. Supers that have been in hard, constant work from 5 to 7 years average a monthly upkeep cost—parts and repairs—of only 33 cents per month. Plenty of owners report even less. Many say, "We have spent nothing on our machine except for new hose and bags"; "No upkeep at all so far." **Per cleaning,** upkeep on the Super averages under two cents.

"Our Super Has Paid For Itself Many Times Over"

Profit—really big money—follows a Super as surely as spring follows winter. Super owners **average** 235 cleanings each season at an **average** take of $4.75 per cleaning. That pays and pays well. And—

59% of ALL CLEANING Jobs Bring In Other Sales and Profits

The records—of Super owners—show that every 1,000 cleanings sell 50 new heating plants, 125 new fire pots, 160 re-sets, 144 new grates, 428 new smoke pipes. This is work that would not have come into the shop at all if the cleaning job had not let the furnace man into the basement and exposed the need for these repairs and new plants.

This Book Has Taught Many How To Make More Money

The free book "A Plan to Increase the Business of Dealers in Heating Plants" tells how to start and manage a furnace cleaning business. It's all in simple, easily understood terms. Anybody who is willing to do his easy part can take this book and "go to town." Write for it. Let us ship you, too, a Super for 3-day free trial. Make a start now.

↘ USE THIS COUPON

The National Super Service Company
1944 N. 13th Street, Toledo, Ohio
Send me the Plan Book and complete information about your free trial plan and the new low-priced Super.

Name .....

Address .....

City & State.....

PERFORATED METALS

Every Sheet Metal Worker needs perforated metal in one form or another.

For processing food products and to withstand certain chemicals, perforated Stainless Steel and Monel Metal are much used.

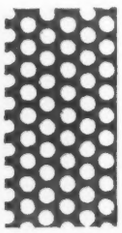
Factory Safety Guards—For this service perforated metal has no equal.

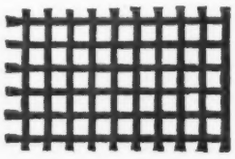
For Grilles, Radiator Enclosures, Air Conditioning Cabinets, we have many beautiful designs.

Write today for information and prices.

You'll like H&K prompt, satisfying work and pleasing prices.

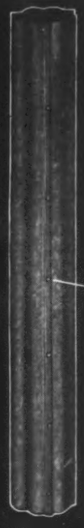
Perforators of metals since 1883. Send us your specifications.





The Harrington & King PERFORATING CO.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.



"BB" The Mark of Quality

Seam Locked Every Few Inches

"Shur-Lock" Pipe

BERGER BROTHERS CO.

229-237 Arch Street, Philadelphia, Pa.

EAVES TROUGH
GUTTER HANGERS
CONDUCTOR FASTENERS
MITRES
END PIECES AND CAPS
CONDUCTOR HEADS
ORNAMENTAL STRAPS
VENTILATORS, ETC.

Write for catalog of the "BB" Line
Buy from your jobber

With the Manufacturers . .

L. E. Meisinger III

Miss L. E. Meisinger, president of "Home Comfort" Furnace & Mfg. Co., will be at Missouri Baptist Hospital, 919 N. Taylor Ave., St. Louis, until about May 17, as a result of a minor operation.

◆

Announces Duo-Therm Division

Motor Wheel Corporation, Lansing, Michigan, has changed the name of its oil burning appliance division and will henceforth use the designation "Duo-Therm Division of Motor Wheel Corporation."

◆

Airtemp Advertising Manager

Airtemp, Inc., Dayton, Ohio, has appointed Edward Bozorth as advertising manager and director of sales promotion, according to an announcement by Colonel A. C. Downey, president.

◆

Schuppener Heads Berger Sales Unit

Berger Manufacturing Co., Canton, Ohio, subsidiary of the Republic Steel Corp., has made R. I. Schuppener general sales manager of the new building products divisions. For the past ten years Mr. Schuppener has been department sales manager of the Wheeling Corrugating Co., Wheeling, W. Va.

◆

Hart & Cooley Expands Plant

Hart & Cooley Manufacturing Company of Chicago reports that an addition of 15,000 square feet to their Holland, Mich., plant is nearing completion. This is the second major enlargement to the Holland plant within the last six months, the first having been completed late last fall.

Officials advise that the additional floor space will be used exclusively for the production of the company's new bar-type forced air registers, and it is anticipated that with these added facilities the company soon will be able to give prompt service on all orders for air conditioning registers.

◆

Reverts to Former Corporate Name

The Thatcher Company, 39-41 St. Francis St., Newark, N. J., for eighty-seven years manufacturers of heating apparatus, has completed its reorganization and has reverted to its former corporate name of Thatcher Furnace Company. Under the same management, Thatcher Furnace Company is increasing its manufacturing facilities and broadening its line of heating and air-conditioning products.

Thatcher Furnace Company was established as the J. M. Thatcher Co. in 1850 by J. M. Thatcher, inventor and patentee of the "Celebrated Tubular Furnace." It is interesting that many of these old furnaces are operating very satisfactorily today with oil burners. The company was later known as Thatcher Furnace Company, and ultimately, without change of organization, as The Thatcher Company. It now resumes the name which it bore for almost a half century.

In 1880 the foundry was established in Newark, N. J., and in 1905 a boiler foundry was built in Garwood, N. J. The later addition of another furnace foundry and a radiation plant at Garwood, enlarged the total floor space to cover more than eighteen acres.

Thatcher Furnace Company's position, as one of the few heating manufacturers to produce and sell warm-air furnaces as well as steam or water boilers, has made it relatively simple to design a line of air-conditioners. Thatcher is, therefore, able, without prejudice, to sell either "direct-fired" or "split-system air conditioners."

Among well-known current Thatcher products are the "New Meteor" furnace, "Warm Friend" pipeless furnace, and the "ComfortMaster" air conditioner.

HERE'S YOUR FURNACE FOR SPRING and SUMMER PROFITS!

Spring and summer profits are not hard to get if you go after them in an intelligent, aggressive manner. Line up your prospects, show them the advantages of an early installation and then ring in your most potent sales argument . . . . . the RYBOLT five point cast iron furnace. You know from past experience that any customer is primarily interested in a good substantial job at a low price . . . . that they want a good looking, quality furnace . . . . and that they DON'T want to have to call you every few weeks for some minor repair job.

The RYBOLT five point cast iron is your answer to any job whether elaborate or simple. You'll save time on the job, easily satisfy the customer . . . . and most important—you'll get a substantial profit in every installation.

Write us NOW!!! We'll show you how to take care of that early-in-the-year business slump.

THE RYBOLT HEATER COMPANY
Ashland Ohio

NIAGARA SLIP ROLL FORMERS

for manufacturing light and heavy pipe, stacks, drums and container bodies, large tank segments and other products on a production basis.

Their quick, easy adjustment, and convenient, rapid operation save time, cut costs and build profits for modern shops. Niagara Slip Roll Formers are built in a complete line of hand and power operated machines for different thicknesses of material and various working lengths. Write for Bulletin 77 giving complete information on this complete line.

There is a complete line of Niagara Machines for the various operations on sheet metal products.

NIAGARA MACHINE & TOOL WORKS
683 NORTHLAND AVENUE
BUFFALO N. Y., U. S. A.

NIAGARA

....One Installation Sells Another

. . . And that's true of all CANTON STEEL Ceiling Installations.

Permanent, attractive and easy to install, they are natural money makers for wide-awake dealers. Once installed they can be easily and economically maintained—no plastering, no papering, no expensive decorating—merely a coat of paint and the owner has a new ceiling. Don't pass up this opportunity to add the modern CANTON line.

Write today for further details.

Sold through all leading Sheet Metal jobbers.

CANTON STEEL CEILING COMPANY

2280 WINFIELD WAY, S. E. CANTON, OHIO

Warehouse Service: 497 West Street, New York City, and Canton, Ohio

GUARANTEED

. . . to please

WE GUARANTEE FAVORITE STOVES AND RANGES BEST IN THE WORLD

That's a lot to say for any heating plant, but we'll back the FAVORITE HERMETIC to the limit. We've been making them for 25 years and haven't had a poor one yet.

You'll find the FAVORITE a real heating unit and famous for economical performance. Once you make an installation, you're certain it won't need servicing for a long, long time.

Drop us a line today for more literature on the complete FAVORITE line. It'll prove a real bonus maker on installations, large or small.

We also have an unusually complete line of repair parts. Write us your needs.

FAVORITE STOVE CO.

PIQUA OHIO

With The Manufacturers . .

Minneapolis-Honeywell Acquires National Regulator

Minneapolis-Honeywell Regulator Company, Minneapolis, has entered into an agreement for the acquisition of the National Regulator Co. of Chicago, making a complete line of pneumatic controls. Information relative to National air operated controls and the augmented Modutrol Service is now available at any branch office of Minneapolis-Honeywell.

◆

Whiting Expands Stoker Division

General T. S. Hammond, president of the Whiting Corporation, Harvey, Illinois, announces broad re-organization and expansion plans for Whiting's stoker division.

The long list of additions to Whiting's organization begins with the appointment of Dr. W. A. Pearl to take full charge of production engineering. R. E. Young will have charge of sales and development engineering. B. J. Spitzka has been appointed educational director. J. A. Depew heads a newly organized service department, and S. M. Steinko has taken charge of advertising and sales promotion.

◆

Fitzgibbons Holds Sales Convention

Fitzgibbons Boiler Company, Inc., Oswego, New York, held their annual sales convention on February 12 and 13 at their plant, attended by seventy-five representatives and branch managers.

The purpose of the meeting was the opening of the new wing for construction of air conditioning equipment, the announcement of latest product improvements and the launching of the largest advertising campaign in the history of the company.

◆

Automatic Products in New Location

Automatic Products Company, Automatic control makers in Milwaukee, has moved to new and larger quarters in the 2400 block on North 32nd Street.

Roy W. Johnson, President, recently purchased the newly built enameling plant formerly owned by the Fuller-Warren Stove Company. This modern sun-lighted building gives over 60,000 square feet of manufacturing space, with room for further expansion.

◆

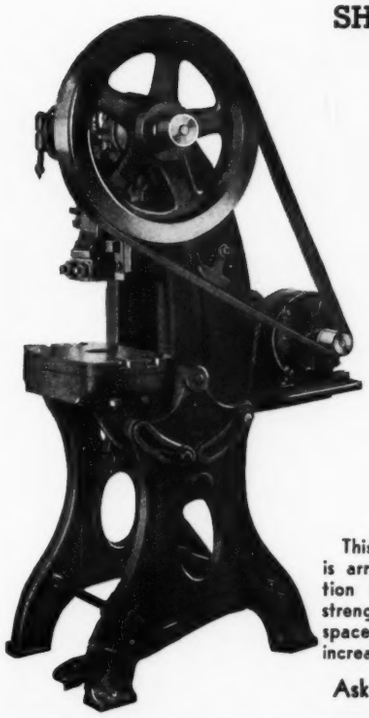
Lewis and Mayflower Merge

Mayflower-Lewis Corporation of Saint Paul will henceforth be the manufacturers of the Mayflower refrigerators and Lewis Air Conditioning equipment. Mayflower, Incorporated, was formerly located at Lima, Ohio. Lewis Air Conditioning Company had its principal manufacturing plant in Minneapolis.

The merger under the firm name of Mayflower-Lewis joins the executive and engineering staffs of the former companies into an advantageous operating unit. The present plant is being fully equipped to handle the combined production volume of the former companies with reasonable allowance for anticipated expansion of sales.

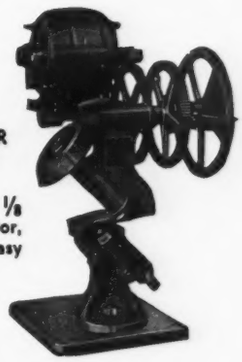
The MARSHALLTOWN Line

PRESSES—Capacities from 10 ton to 70 ton.
SHEARS—Capacities 18 gauge to 1/2" plate.



No. 116
THROAT SHEAR
Is especially designed for Cutting Inside Circles and Irregular Shapes.

No. 18
MOTOR POWER THROATLESS SHEAR
Complete with 1/8 HP standard motor, self-feeding and easy to operate.



No. 2
PRESS
This ruggedly constructed Press is arranged with proper distribution of weight giving maximum strength and affording ample die space, low operating cost and increased output.

Ask Your Jobber or Write

No. 18
HAND POWER THROATLESS SHEAR
For irregular cutting or straight splitting of 18 gauge sheets or lighter. Will cut sheets of any dimensions.

Marshalltown Manufacturing Co.
MARSHALLTOWN IOWA

MARSHALLTOWN IOWA U.S.A. MFG. CO.

Easy Sales— and Profitable!

Sales are easy with the Swartwout Rotary Ventilator because it's a *known* product — with a time-proven record of dependability, efficiency, and economy. Industry has confidence in this ventilator, and your prospects and customers will have confidence in YOU when you fill their requirements with Swartwout Rotaries. Write for catalog and price list.

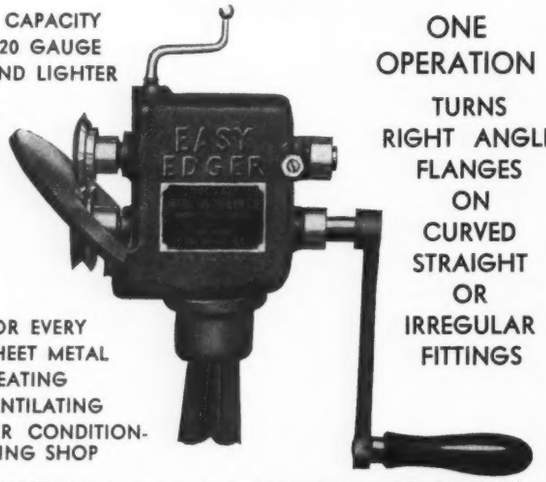
THE SWARTWOUT CO.
18615 Euclid Avenue, Cleveland, Ohio

Swartwout ROTARY BALL BEARING **Ventilatiors**

AT LAST!

THE EASY EDGER—A FLANGING MACHINE THAT FLANGES IN—

CAPACITY 20 GAUGE AND LIGHTER



ONE OPERATION

TURNS RIGHT ANGLE FLANGES ON CURVED STRAIGHT OR IRREGULAR FITTINGS

FOR EVERY SHEET METAL HEATING VENTILATING AIR CONDITIONING SHOP

NOTE—WILL TURN ONE HEIGHT FLANGE ONLY ($\frac{7}{32}$)

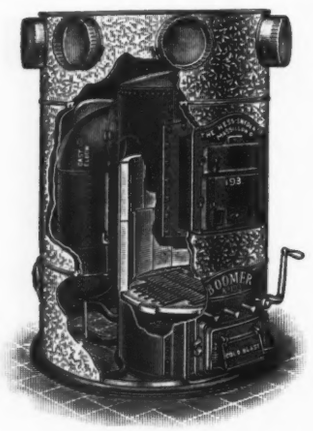
MORE SIMPLE THAN A BURRING MACHINE	NO GAUGES TO ADJUST	SPEEDY ACCURATE UNIFORM EDGES

WRITE FOR DETAILS

WARD MACHINERY COMPANY

564 W. WASHINGTON BLVD.

CHICAGO ILLINOIS



Boomer Boiler Plate Furnaces

Also made with duplex grates and upright shaker.

Have been successfully made for 23 years. Where introduced have given satisfactory service. The fire pot liners are the best we can buy and we know of several Boomers that still have the original liners in, which are 23 years old. We have been making cast iron Boomers for 50 years.

If you are intereated in selling a strictly high grade furnace, ask for prices and agency.

Nothing but the best of material enters into the making of Boomers.

When repairs are needed, avoid risk of dissatisfaction by ordering direct from the original patterns. Prices are low.

We sell to legitimate dealers only.

THE HESS-SNYDER CO., MFRS.

Massillon, Ohio

News Items . . . . . .

Charles N. Holmes Dies

The death is reported of Charles N. Holmes, who was engaged in the sheet metal and plumbing business in Seattle, Wash.

◆

L. H. Leach Passes

L. H. Leach, 68, prominent in the tin and roofing trade, died at his home 1007 Third Street, Moundsville, W. Va., March 22 after a long illness.

◆

Doublelock Copper Roof

Copper Roofs Company, 566 Park Street, Jacksonville, Florida, recently roofed the residence of A. M. Elder, 4130 Oxford Street, in Oretga, with a Doublelock copper roof.

◆

Tin Shop Active

Montgomery Tin Shop, 8 Madison Avenue, Montgomery, Alabama, headed by B. L. Taylor and G. H. Guthrie, is one of the actives in the furnace and sheet metal roofing trade in the Alabama capital city.

◆

Hession Roofing in Flood

Hession Roofing and Painting Co., 1221 West Market, Louisville, Kentucky, re-roofing contractors and active for more than sixteen years were busy doing roofing, guttering and furnace pipe work and serving the trade in all sections of the city as the waters had receded from the flooded areas.

◆

In Birmingham

Alabama Tin Shop, 311 S. 20th Street, Birmingham, Alabama, does a very complete line of sheet metal work, heating and roofing. Furnace installations and gutters presented a very good winter volume in this section, the winter as a whole being typical.

◆

Forced Air Heating School

Banner Repair Parts Co., Youngstown, Ohio, jobbers of repair parts and furnaces and accessories, will stage a Forced Air Heating School in Youngstown on May 25 and 26.

The instruction will be based on the New Technical Code for Mechanical Warm Air Heating under the direction of Fred. R. Bishop of The Brundage Company and member of the Installation Codes Committee of the National Warm Air Heating & Air Conditioning Association.

Dealers and salesmen from Youngstown and neighboring towns are invited to attend regardless of the furnaces or blowers they are handling. This school will not exploit any line of equipment. It will be strictly for the study of Forced Air Heating based on the new code.

◆

Rutgers Home-Study Course

Rutgers University, New Brunswick, N. J., is offering a home-study course in air conditioning which is a complete revision, greatly enlarged, of the pioneer course in the subject first offered three years ago. Copies of a folder which, in addition to the air conditioning course, describes briefly the related subjects of heating, ventilating and refrigeration as well as the elementary subject, heat, and a well-organized course in the manufacture, distribution and utilization of gas.

Public utilities, in particular, have organized study groups in these subjects for their engineering, sales and service personnel, using the supervised home-study method—details of which will be supplied on request.

LIFE TIME HAMMERS

Head and handle forged of one-piece tool steel—I-beam construction—head can't come off—handle can't splinter. Made under Estwing Patent No. Re-16820.

Whitney Tools popular everywhere. No. 2 Punch, illustrated, sturdy, easy to operate, long life — length 23 in. Capacity 5/16 - in. hole through 1/4-in. iron. Punches and dies in sizes from 3/32 to 1/2 in. by 64ths.

Ask Your Jobber

W. A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL

PREMIER
FURNACE CLEANERS

ONE HORSE POWER MODELS $79.50 and $84.00
HALF HORSE POWER MODELS $55.00 and $59.50
COMPLETELY EQUIPPED

Premier Furnace Cleaners are powerful and light weight, yet sturdily built to stand years of rugged service. Weighing less than 50 pounds, they are one-man cleaners and have been the furnace man's favorite for years. Premier Cleaners are ideal for upstairs use and may be used independently from the container for suction and blowing use in cleaning air ducts, registers, grills, radiators and air conditioning equipment.

Motor specifications for these powerful cleaners are:
1 H.P. maximum vacuum 46 inches in water.
1/2 H.P. maximum vacuum 31 inches in water.

Business-Getting, Return Post Cards are Available for Dealers at Low Cost

Buy It From Your Local Jobber or Write the Manufacturer

Furnace Cleaning Instruction Booklet Free with Each Cleaner

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road • Cleveland, Ohio

BEAD CHAIN*

This smooth running, non-kinkable chain of swiveled metal beads improves both the appearance and operation of ventilator, sky-light, heat control and other regulators. From your jobber, in standard sizes, metals and finishes. Can we help you solve a problem?

COUPLINGS
Cord Connectors and Pendants for many uses, in standard sizes and finishes.

THE BEAD CHAIN MANUFACTURING CO.
*TRADE MARK REG. U.S. PAT. OFF.
BRIDGEPORT, CONN.

NU DRY
FURNACE CEMENT
Best by Test

Set your summer furnace repair jobs with Nu Dry. The economical, durable cement, you can't do better than Nu Dry. Check the six superior features.

Fill out the coupon for free 5½ lb. sample. . . .

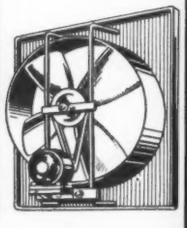
- It comes to you in dry form.
- Takes less material to set a furnace.
- Does not crack or powder when furnace is fired immediately after applied.
- Will not shrink—keeps joints tight—stands high temperature—is not affected by temperature changes.
- No loss because it will not harden in containers—will not freeze in winter.
- Requires only 5½ lbs. where you ordinarily use 10 lbs.

We'll prove it further! You just fill out the coupon.

PYROLITE PRODUCTS CO.
1221-31 W. 74th St., Cleveland, Ohio

Name .....
Address .....
Jobber's Name .....
Jobber's Address .....

INTERNATIONAL
FANS & SYSTEMS



Complete industrial line. Important installations in many fields. Full information on models, diameters, and capacities upon request.

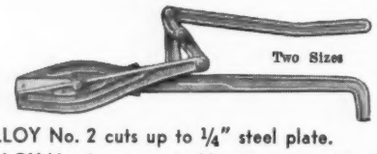
INTERNATIONAL ENGINEERING, Inc.,
DAYTON, OHIO

Victor heating equipment is a line that enables you to buy all your requirements from one reliable source.

This Victor demonstrator enables Victor dealers to close sales at a profit. Investigate this money making line. Write or wire.

HALL-NEAL FURNACE CO., Indianapolis, Ind.

PORTABLE SHEARS
ALL-ALLOY

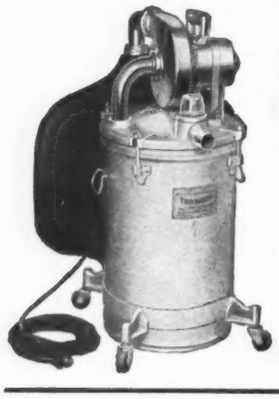


ALL-ALLOY No. 2 cuts up to ¼" steel plate.
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.
Special blades may be had for shearing stainless steel.

FULLY GUARANTEED

BREMIL MFG. CO. Erie, Pa.

How to Sell Furnaces and Repairs
WITH
The TORNADO Furnace Cleaner



The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

The TORNADO is the most powerful furnace cleaner built. Leads the field! Low price — easy payments — free trial. Approved by Anthracite Institute and Underwriters Lab. Thousands in use.

Write now for complete information.

Breuer Electric Mfg. Co.
865 Blackhawk Street, Chicago, Ill.

News Items . . . .

Hartin of Columbus Active

W. R. Hartin and Son, Inc., 830 Harden St., Columbia, S. C., does a full line of metal work, handles furnaces, carries furnace parts and Gower stokers. A free inspection of heating plants was staged.

◆

Krauss Gets Ocala Contract

Krauss Roofing and Sheet Metal Co., St. Petersburg, Florida, was one of the subcontractors for the improvements at the Florida Industrial School for Girls, a state institution at Ocala. Eric T. Clauson, 1221 15th Ave., North, St. Petersburg, Florida, was the general contractor.

◆

PWA Uses Sheet Metal

Largest of all the PWA projects at Florida State institutions at this season is the $675,520 improvements, including five buildings, at Chattahoochee. Beers Construction Co., Atlanta, Georgia, is the contractor. Florida Sheet Metal Works have the metal work.

◆

Kansas City, Missouri, Activities

Furnace contractors in Kansas City, Missouri, report a very considerable line of new work in the 1937 season. Among the actives are: Olmstead Furnace and Roofing Co., 3701 Woodland; Kansas City Furnace Co., 624 Prospect; O. K. Furnace and Roofing Co., 2702 East 31st St.; A. Holtman Heating Co., 700 E. 18th St.

◆

State Compensation Laws Approved

Five State unemployment compensation laws enacted since December 21 were approved by the Social Security Board recently as meeting the requirements of title IX of the Social Security Act.

The laws added to the list of 30, already approved, were those of Iowa, Michigan, Minnesota, South Dakota, and Vermont.

◆

Air Conditioning Statistics

Statistics on the value of orders booked for air conditioning systems and equipment were released recently by William L. Austin, Bureau of the Census, Department of Commerce.

Table I, with statistics for 98 manufacturers, represents a new series beginning January, 1936, and resulting from the expansion of the scope of the industry. The total for the year was $43,566,678. Orders booked during December amounted to $4,229,134, as compared with $3,657,016 for November, 1936, an increase of 15.6 per cent.

Table II shows comparative statistics for 54 identical manufacturers for the fan and unit heater groups for the years 1934, 1935 and 1936, with figures for the month of December of each of these years.

◆

Federal Trade Commission Defines Air-Conditioning

The Federal Trade Commission has recently reiterated its ruling that appliances which do not meet its definition of "air conditioning" cannot be advertised as such. The FTC's definition of what constitutes "air conditioning," declares:

"The words 'air conditioning' signify the control, by a mechanical device, of the temperature, humidity and circulation of the air in rooms, buildings and railroad passenger trains; and the non-performance of any one or more of these functions takes the device out of the class of air conditioners, according to the understanding of the trade and the purchasing public.

"The wording of this definition should make it applicable to systems installed as well as to equipment, appliances and devices. Its protection to the purchaser, in this phase of air conditioning, is equally desirable at the present time."

Repairs Firepots

without tearing down furnace

Here is a new way for you to repair burned-out, cracked, or broken firepots. A quick profit way—a way more home owners can afford. FIRELINE is a new, moist, plastic "firebrick" similar to that used in industrial boilers. Made from refractory clays, it comes ready to be moulded to any thickness entirely around the inside firepot walls. Build an ordinary fire and your FIRELINE "sets" into a one piece firebrick that will not crack, melt, or crumble, even at a temperature of 3000°F. No heatless days waiting for new castings. You don't even have to take down the furnace. You can repair a firepot and have the fire going again in a few hours—That's SERVICE for the home owner and profit for you.

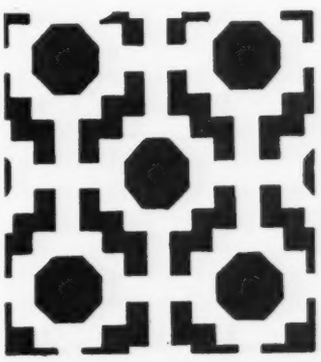
There's a lot of FIRELINE business in every community—business you can only get with FIRELINE. Get behind FIRELINE and you'll keep busy all year.

Write today for FREE SAMPLE, installation data, and details of sales Helps and Profit set-up.

Fireline Stove and Furnace Lining Co.
1866-E Kingsbury St.
Chicago, U. S. A.

LACECANE

more FREE AIR SPACE *with Greater Concealment*



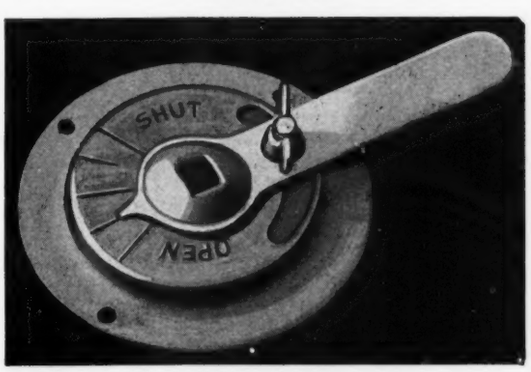
Lacecane is a development of an American Indian design. It is particularly suitable where the architectural motif is one of primitive simplicity. It harmonizes equally well with the essential characteristics of our so-called modern style. Made in Bronze, Brass, Aluminum as well as Cold Rolled Steel. Send for this folder. It shows LACECANE and many other new WISSCO designs.

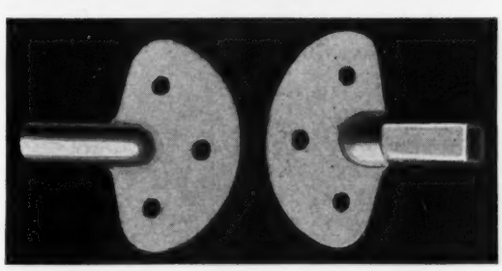
WICKWIRE SPENCER STEEL COMPANY
41 East 42nd St., New York City
Worcester Buffalo Chicago San Francisco

WICKWIRE SPENCER perforated metals

APEX DAMPER REGULATOR

LOCK-TITE





⅜" F. Regulator and ⅜" No. 3 Damper Bearings.

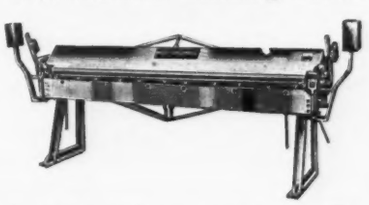
Order by Set No. 31-3. Complete with Screws and Rivets. Order from your jobber.

OHIO PRODUCTS COMPANY
17606 Milburn Ave., Cleveland, O.

"THE TOOLS YOU NEED TODAY"

25 YEARS EXPERIENCE BUILDING QUALITY PRODUCTS

NEW
Whitney-JENSEN
18 ga.
Combination Bending Brake



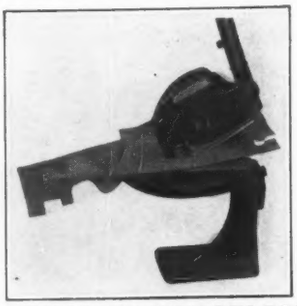
• Here's what you have been waiting for! A medium-size COMBINATION Bending Brake at a reasonable price. Made in 5-6-8-10 ft. lengths. Time-tested Whitney-JENSEN construction features insuring durable accuracy, together with a new quick-acting change-over for box and pan bending. Write for our Descriptive Circular—or see your Whitney dealer!

WHITNEY METAL TOOL CO.

OVER 80 ITEMS FROM WHICH TO CHOOSE

91 FORBES ST., ROCKFORD, ILL.

BEVERLY THROATLESS SHEAR



Here's the shear for the sheet metal worker! Cuts any shape to any size with a minimum of effort, and in a jiffy. It can be used for straight, circular or irregular cutting and will give a lifetime of service.

The Beverly Throatless Shear is made in two sizes to handle up to either 14 or 10 gauge metal. The light machine weighs 16½ lbs., and heavier models 33 lbs.

Reduce your operating costs and speed up production with a BEVERLY Throatless Shear. Write today for literature or see your jobber.

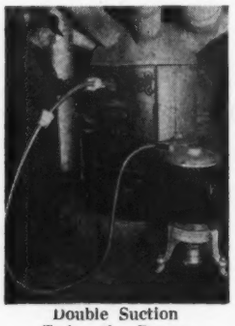
BEVERLY THROATLESS SHEAR COMPANY
3009 W. 110th Pl., Dept. 3 Chicago, Illinois

Ask for...
BURNLEY TRADE MARK
SOLDERING ..... PASTE
SOLDERING ..... SALTS
SOLDERING ..... STICK
SOLDERING .. SOLUTION
PIPE JOINT COMPOUND
Burnley Battery & Mfg. Co., North East, Pa.

ACME "Hot Spot" WELDERS

Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.
Write for literature and prices
Don't Rivet
SPOTWELD!
with an ACME
Lifetime Guarantee!
Complete range of sizes
ACME ELECTRIC WELDER CO.
Warehouses in principal cities
5619 Pacific Blvd. Huntington Park, Calif. (Los Angeles County)

Longer Life
Fewer Repairs
with a
KENT
DOUBLE SUCTION
THE STURDY BUILD
FULLY PROTECTED DUST BAG
COMPLETE FAN PROTECTION
are only three of the reasons why your KENT investment brings you MORE FOR YOUR MONEY.
INVESTIGATE



Double Suction
Twice the Power
One-Man Unit

THE KENT COMPANY, INC.
167 CANAL STREET ROME, N. Y.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 116.

157—Package Unit Furnace Blower

Lau Blower Company, Dayton, Ohio, presents a new 1937 package unit furnace blower—a new knock-down package unit—in a four-page folder and small envelope stuffer. This is the 700 series Lau blower.

158—The Heil Line

The Heil Co., 3000 W. Montana Street, Milwaukee, Wis., is distributing a folder describing and illustrating the Heil furnace-burner air-conditioning unit, boiler-burner unit, the indirect unit and their four oil burners.

The new model X Heil oil burner is fully illustrated and described.

159—Nature Air Conditioning Systems

Arthur Betz, 789 South Broadway, Pasadena, California, is distributing a 4-page booklet on the Betz Nature Air conditioning system.

The system consists of a Betz high efficiency furnace using gas for fuel, thermostatically controlled, filters, humidifier, and Furblo blower, and may be used for cooling in summer.

160—Conditioning Units

Clarage Fan Company, North and Porter Streets, Kalamazoo, Mich., is distributing Bulletin 107, Edition No. 1, covering their Multitherm conditioning units, for stores, offices, theatres, restaurants, hospitals, etc. There is a cabinet type unit which cleans, cools and dehumidifies, and provides a circulation of conditioned air under positive fan pressure, as well as units for summer cooling only and winter heating only.

161—6,000 Cool Spots

United States Air Conditioning Corporation, Northwestern Terminal, Minneapolis, Minn., is distributing a 24-page 3½x6¼-in. booklet describing and picturing a few of the 6,000 typical U. S. AircO installations, each a custom-built job—engineered they say specifically for the room or building in which it is to function.

The company engineers and manufacturers U. S. AircO systems for winter heating and ventilating and for summer cooling and ventilating—Arctic Nu-Air, Kooler-Aire, cold water Kooler-Aire and refrigerated Kooler-Aire.

162—Improved Miles Junior

The Henry Furnace & Foundry Co., 3471 E. 49th Street, Cleveland, Ohio, is distributing an envelope stuffer describing the Miles Junior air conditioner for attaching to a gravity warm air furnace.

The unit uses four Owens-Illinois "Dust Stop" filters, a three-speed heavy duty motor mounted in special live rubber insulation, and a quiet fan, equipped with Torrington blades. Operation of the fan is governed by a furnacestat located inside top of furnace. The Moncrief automatic humidifier adds the last element of winter air conditioning.

163—Attractive Presentation Book

Perfection Stove Company (Incorporated), Cleveland, is distributing an attractive presentation book with black viscoloid cover and red plastic binding, illustrating many homes that are enjoying continuous air conditioned heat from Superfex oil burning, air conditioning, heating plants.

Superfex operates on the high-low principle, not the usual on-and-off principle. The circulation of filtered humidified air is continuous. When less heat is required, the thermostat turns down the flame, but the blower continues to circulate conditioned air every minute of the day and night.

An attractive broadside describes three of the smallest models of the Superfex plants.

DEPENDABILITY

Lyonore Metal gives you double assurance-- 1. proved superiority under all conditions-- 2. the integrity and long years of experience of Lyon, Conklin & Company, Inc. behind every purchase. To be sure of maximum life and lasting economy look for the Lyonore Metal trade mark. Write for complete information.

LYON, CONKLIN & COMPANY, Inc.
Baltimore, Maryland

Lyonore Metal
CHROMIUM • NICKEL • COPPER • IRON ALLOY

Equals

1 lb. 20 lbs.

Every pound of pressure on the handle of a Viking produces 20 pounds at the blade. Viking's original compound lever arrangement does it. Choose a Viking for its strength, long life, easy handling and low cost.

The cutting blade, ¼" thick, made of specially tempered high grade tool steel, keeps its edge for a remarkably long time and is easily replaceable. Write for complete details—buy from your jobber.

VIKING SHEAR CO. ERIE, PA.

THE MOST POWERFUL—PORTABLE ONE-MAN FURNACE CLEANER OBTAINABLE

We prove our statements

FREE TRIAL—EASY PAYMENT PLAN

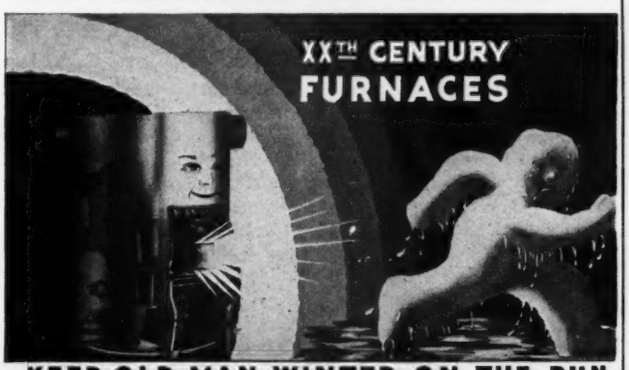
Write for details

Grand Rapids Furnace Cleaner Co.
Grand Rapids, Mich., U. S. A.

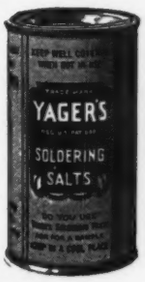
FURNACE REPAIRS
made with
CHRONAT IRON
RESISTS WEAR AND FIRE
A PRODUCT OF THE NATIONAL FOUNDRY & FURNACE CO.

Fit Right — Last Longer

THE NATIONAL FOUNDRY & FURNACE CO.
1144 Bolander Ave. DAYTON, OHIO



KEEP OLD MAN WINTER ON THE RUN
XX TH CENTURY HEATING & VENTILATING CO.
AKRON, OHIO



YAGER'S
Soldering Salts
FOR ALL SHEET METAL SOLDERING

Packed in ½ lb., 1 lb., 5 lb., 25 lb. and 50 lb. cans
AT YOUR JOBBER OR WRITE US

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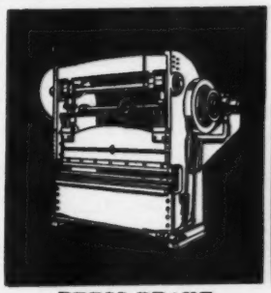

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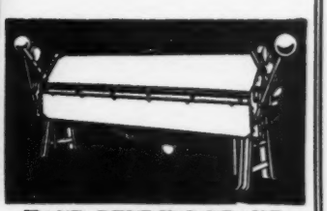

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164—Parts and Accessories Catalog

Borg Warner Service Parts Company, 310 South Michigan Avenue, Chicago, Illinois, distributed 20,000 of the first consolidated catalog of 180 pages on April 1.

165—Turbine Pumps

American Steam Pump Company, 60 Capitol Avenue N. E., Battle Creek, Mich., is distributing Bulletin 450, Edition No. 1, covering American-Marsh Type V Turbine Pumps with only one moving part.

166—Spring Cleaning Broadside

International Heater Company, Utica, N. Y., is distributing a cleaning broadside and a return card for the heating trade.

The broadsides are offered free to the heating contractor upon his promise to use them and upon receiving his order for a like number of postal cards imprinted with his name and his own price for the cleaning. There is a charge for the postals.

167—1937 ASH&VE Guide

The American Society of Heating and Ventilating Engineers, New York City, is distributing the 15th edition of The Guide with 808 pages of technical data for those interested in heating, ventilating or air conditioning.

Many changes have occurred during the past year in the industries served by The Guide and the technical material has been revised and in some cases completely rewritten to give users up-to-date, useful and authoritative data.

In the Technical Data Section are many changes and additional pages. Some of the changes and additions include: Recalculated tables for the properties of dry and saturated air, based on the instantaneous specific heats of air. The chapter, Physical and Physiological Principles of Air Conditioning, has been completely rewritten and covers the varied fundamental requirements, which must be considered in properly designing a system to satisfy human environments. Heat transmission coefficient tables have been amplified. Problems of humidification, dehumidification and water cooling are discussed in a new chapter. Mechanical draft cooling tower design factors are presented in tabular form with conversion factors corresponding to design wet-bulb temperature. New illustrations appear.

Other chapters, completely rewritten are Automatic Control, Sound Control, and Air Distribution, featuring the latest information obtainable.

A revised Bulkeley Psychrometric Chart with an additional directrix line is included. The feature, Problems in Practice, is continued.

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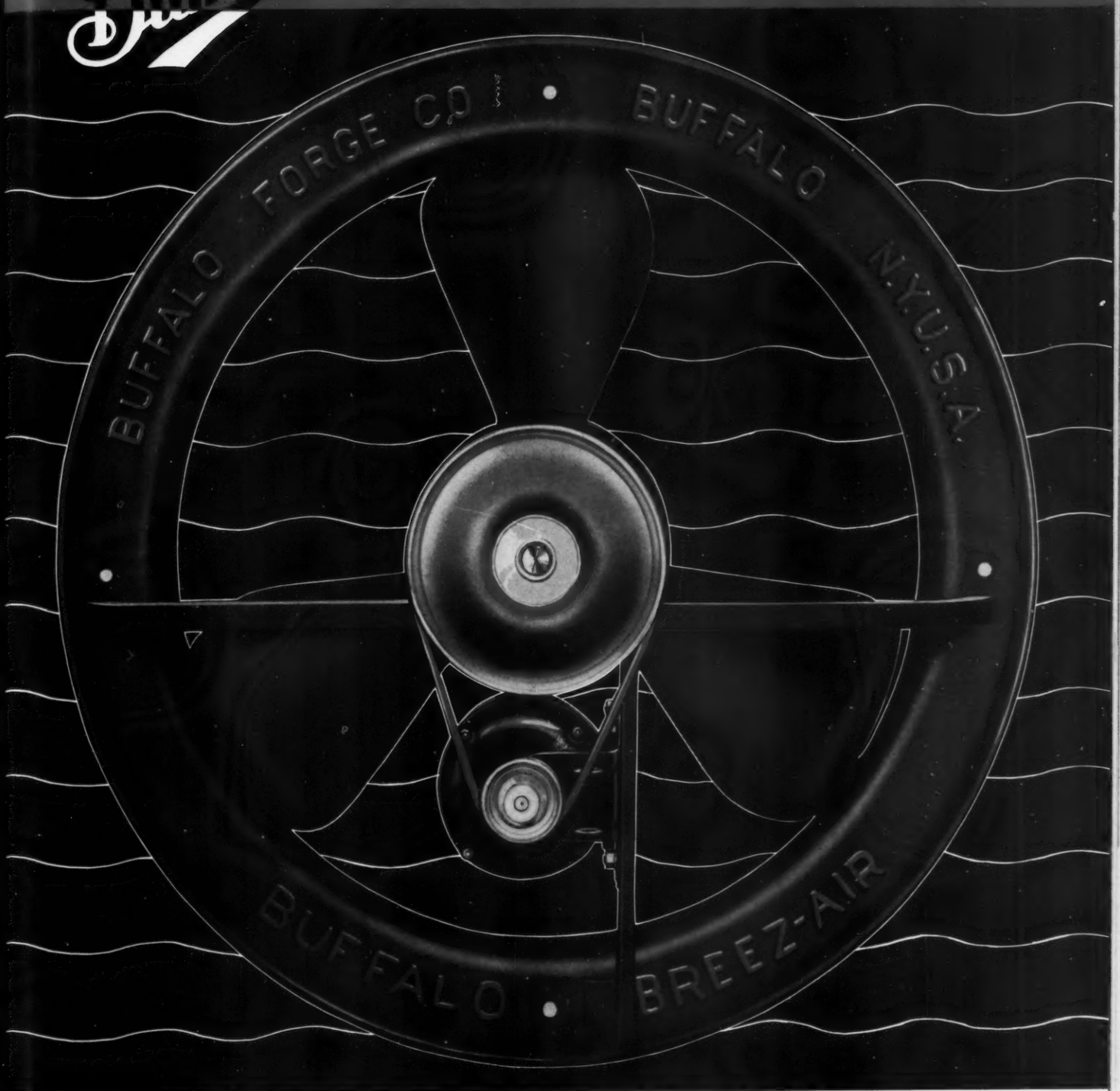

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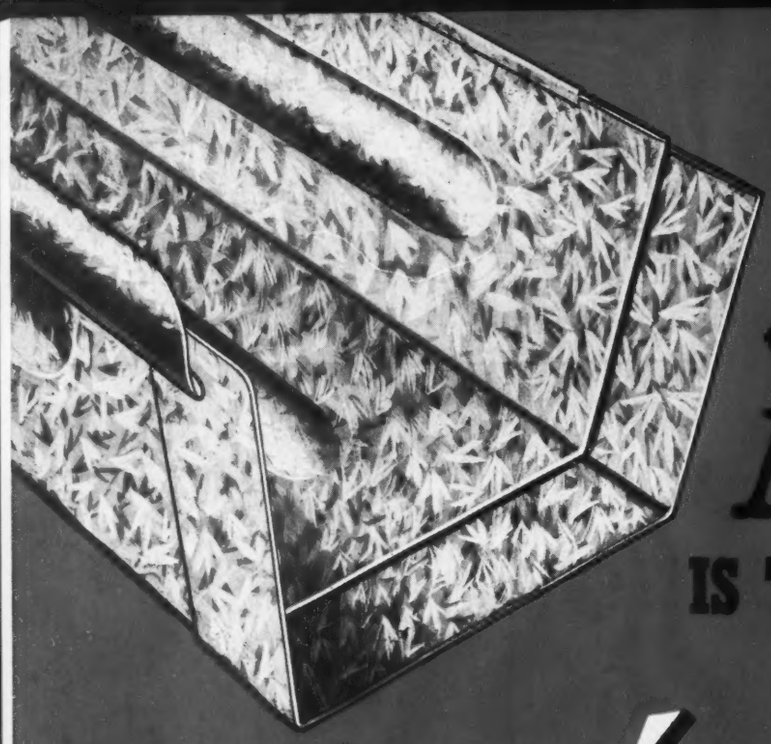

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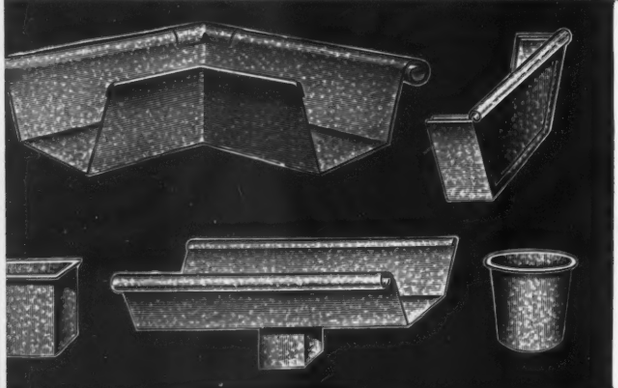

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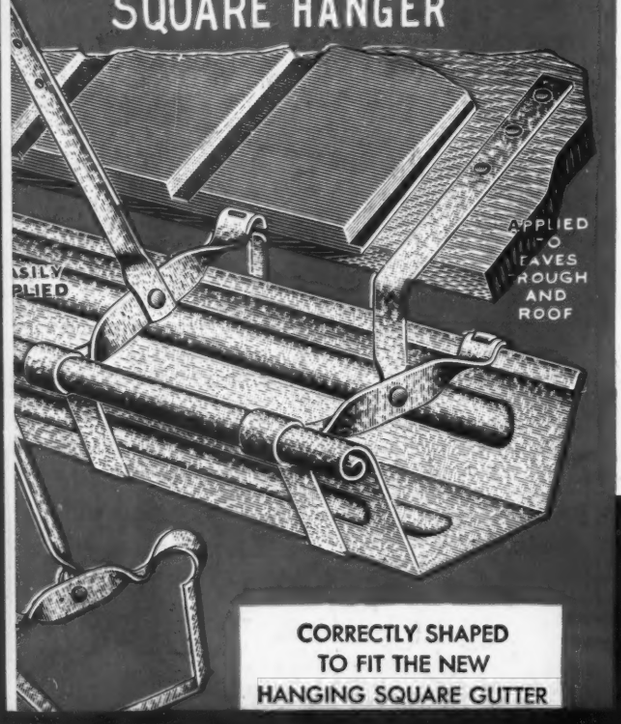

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